

Humane Industry :

OR, A

HISTORY

Of most

Manual Arts,

Deducing the Original, Progress,
and Improvement of them.

Furnished with variety of
Instances and Examples, shew-
ing forth the excellency of

Humane VVit.

[*by Thos. Powell, D.D.*]

Τέχνη κρατίζειν, ἀνθρώπων γινώσκουσα. *Euripid.*

LONDON,

Printed for *Henry Herringman*, and at Rob.
sold at his Shop, at the *Blue-Anchor*, in the
Lower Walk of the *New-Exchange*. 1661.

Human Industry:

OF A

HISTORY

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Manual Arts

Defining the Original Progress
and Improvement of them.
Illustrated with various
Influences and Examples
for form the excellency of

Human Wit.

By Thomas Wilson

LONDON

Printed by Thomas Wilson, and
Sold by John Wilson, in the
Lower Walk of the New Exchange, 1685.

To the READERS.

Gentlemen,



Hough this Curious Piece
you are here presented
with, needs neither Preface
nor Apologie for its pub-
lication, yet I perceive you
are now grown to that delicacy or rather
state in your Diet, you will not eat with-
out a Taster. Give me leave therefore
to acquaint you, That those to whose
censure I permitted this Book, before I
sent it to the Press, (and in whose Judge-
ment I have some reason to confide) have
assured me it hath in it those two Graces
of Attraction, *Novelty* and *Excellency* in
its kind; That the Title (which is a fault
you may the more easily pardon, because
not often committed) does modestly veil
many perfections in the Work it self, in
which you have several curious remarks
on *Musique*, *Limning*, and other Noble
Arts, as well as those that are properly
termed *Manual*; and those too so hand-
somely treated of, with that excellency of
Wit, that fair abundance and variety of
A 3 judicious

To the Readers.

judicious reading, that roundness, strength, and dignity of Stile, that you will imagine your selves even amongst the *Mechanique Arts*, to be conversant in the *Liberal*. The meanest things are ennobled here by the Expression; and all our Author touches he turns to Gold: So that for what concerns my self, I may confidently affirm, I have in the publication of this Treatise, perform'd an acceptable service to all ingenuous persons: And for the Author, I may adventure to say, He hath by this Work particularly honoured that Art of which he gives you so handsome an account; I mean, *The Invention of PRINTING.*

The

The Principal Authors.
mentioned in this Work.

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Aristotle.

Aldovrand.

Athanas: Kircherus.

Apuleius.

Archimedes.

Ant: Gellius.

Augustin.

Ælian.

Baker, Sir Richard.

Bartas.

Bacon Roger.

Bacon, Vic. St Albans.

Busbequius.



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CAP.

CAP. I.

ΩΡΟΛΟΓΙΚΗ;

O R

The Invention of *Dyals,*
Clocks, Watches, and other
Time-tellers.

Time is the most precious commodity that man doth enjoy; because time past, cannot be revoked; and time lost, cannot be repaired.

*Damna fleo rerum, sed plus fleo damna
 dierum.*

Rex poterit rebus succurrere, nemo diebus.

Lost Treasure I bewail, but lost Days
 more;

Kings can give treasure, none can days
 restore,

C

There

Therefore men should set a due estimate upon this commodity, and expend it thriftily and wisely : to which purpose the ancient *Sages* of the world have ingeniously devised a way to divide even the Natural day (which is one of the least measures of time) into hours, and those into quarters and minutes, and into lesser Fractions then they; that by this *Horometry*, they might mete out and proportion business to the time, and time to the business in hand. The name of *Hora*, Hours, came from *Horus Apollo*, an Egyptian Sage, who first divided the day into those portions we call hours, as *Macrobius Saturnal. l. 1. cap. 21.* informs us.

In *Ægypt* there was a Beast of a very strange kinde, called *Cynocephalus*, kept in the Temple of *Serapis*, which in the time of the two *Æquinoxes*, did make water twelve times in a day, and so often in the night, and that regularly, at even spaces of time; from the observation whereof they divided the natural day into twenty four hours; and that Beast was their Clock and Dyal, both to divide the day, and reckon the hours by. This gave a hint (belike) to the *Clepsydra*, or water-glasses (invented by *Ctesibius* of *Alexandria*)

dria) which distinguished the hours by the fall or dropping of water, as *Clepsammidia* or Sand-glasses did by the running of sand: *Miro modo in terris aqua peragit, quod Solis flammeus vigor desuper moderatus excutrit.* Cassiod. de Divin. Lection. c. 30. And to shew they owed the invention to this creature, they used to set one carved on the top of these Water glasses, as may be seen in *Kirker* in *Mechanica Aegyptiaca*. The Heavens are the grand universal clock of the world, from whose incessant and regular motion, all times here below are distinguished and measured.

And because time is in continual flux or motion, and passes away with silent feet, insensibly and invisibly, therefore it was necessary to invent a way how to make the motion of time (according to the several divisions thereof) visible to the eye, or audible to the ear, that it should not steal away without our notice; but that we might tell and count its steps and stealth.

Anaximenes the Philosopher was the first that took an account of time by shaddows projected on the ground, and which changed and moved according to

the motion of the Sun, from which observation he devised Sun-dyals called *Scioterica*. Though *Vitruvius* ascribes the Invention to *Berosus* the Chaldean, who framed *Vasa Horoscopa*, and *Epicyclia excavavata cum stylo* (as he terms them) certain hollow Dyals (like dishes) with Stiles or *Gnomons* erected in the middle. At *Rome* they counted the day (for a long time) by the shaddow of a brazen Obelisk or Pillar: when the shaddow of the pillar did fall in such a place, they did account it Noon or Mid-day, and then a Cryer was appointed to cry it about the Town; So likewise at Evening, when the shaddow fell in such a place, the Cryer proclaimed *horam supremam*, the last hour of day: other distinctions they had none as yet.

The *Nasican Scipio* was the first that brought the use of Water-glasses amongst them, and distinguished the hours of day and night; until his time, *Populo Romano indiscreta lux fuit*, saith *Pliny*, the Roman people had no division of hours; as the Turks (at this day) have no distinction of their ways by miles, nor of their days by hours, as *Busbequias* relates *Ep. 1. Legat. Turc.* In *Plautus* his time, there

was great store of Sun-dyals in Rome; which he calls *Solaria*; for in one of his

* Comedies, he brings in an hungry servant complaining of the number of them, and cursing the Invention in these expressions.

Called *Bæotia*, which is lost: but these words are cited by *Aul. Gellius* cap. 3.

*Ut illum Dii perdant qui primus horas
repperit,*

*Quiq; primus adeo statuit hic Solarium,
Qui mihi comminuit misero articulatim
diem.*

*Nam me puero venter hic erat Solarium
Multum omnium istorum optimum ac
verissimum.*

Ibi iste monebat esse, nisi cum nihil erat. i. Edere
Nunc etiam quod est non estur nisi Soli
labet*

*Itaque jam oppletum est oppidum solaris
Major pars populi, aridi reptant fame.*

Among the Persians every ones bel-ly was his Dyal: so it was in *Ammianus Marcellinus* his time: But these ways of *Horometry* were rude and imperfect. By *Water-glasses* the account was not regu-lar: for from the attenuation and con-densation of the water, the hours were shorter or longer, according to the heat or coldness of the weather. Then for the

Sun-dyals they did serve but at some times, only by day time, and then not alwaies neither, but when the Sun shined. To remedy these defects, some wits did cast about how to distinguish the hours of the night as well as of the day; and of cloudy days as well as of serene and clear. Hereupon some Engines and contrivances have been composed by *Trochilique* art, or the artifice of Wheels; which by the motion of several Wheels, and Springs, and Weights, and counterpoizes should give an account of the time, without Sun or Stars; and these were called *Horologes*.

Severinus Boetius a worthy Patrician of *Rome*, and a most eminent Philosopher and Mathematician, was the first (that I finde) that contrived any Engine of this sort: *Theodoricus* King of the Goths wrote a Letter to the said *Boetius* to beg one from him for to bestow on his brother in law *Gundibald* King of *Burgundy*; in which Letter he calls it, *Machinam mundo gravidam, cælum gestabile, rerum compendium*: A portable heaven, and a compendium of the heavenly Sphears, as *Cassiodorus* hath it, who was the penman, in the first book of his *variae lectiones*.

Aaron

Aaron King of Persia sent such an Instrument for a present to *Charls* the great King of France, in the year 804. it was made of Copper, & *Arte Mechanica mirifice compositum*, saith *Hermannus Contractus*, who doth describe the same more largely in his history.

Of these Horologes, some are *mute*, and some *vocal*: *Vocal* I call those which by the sound of a Bell striking at just intervals and periods of time, do proclaim the hour of the day or night, yea, even half hours and minutes; by the benefit whereof, even blinde men that can see neither Sun nor shaddow, and those that lie in their beds, may know how the time goes, and how long they have bin there, although they slept all the while; and are properly called Clocks, from the French word *Cloche*, a Bell.

It rota nexa rotis, tinnulaque æra sonant.

- *Mute* Horologes are such as perform a silent motion, and do not speak the time of the day, but point at it with an Index, such as are Sun-dyals and Watches; the last of which go by springs and wheels, as the others by weights and wheels: yet

some of these are vocal too, and carry Bells and Alarums, to signifie unto us the stealth of time. Many carry Watches about them that do little heed the fabrick and contrivance, or the wit and skill of the workmanship; as there be many that dwell in this habitable world, that do little consider or regard the *wheel-work* of this great Machin, and the fabrick of the house they dwell in. A King of *China* upon his first seeing of a Watch, thought it a living creature, because it moved so regularly of it self, and thought it dead when it was run out, and its pulses did not beat.

The wit of man hath been luxuriant and wanton in the Inventions of late years; some have made Watches so small and light, that Ladies hang them at their ears like pendants and jewels; the smalness and variety of the tools that are used about these small Engines, seem to me no less admirable then the Engines themselves; and there is more Art and Dexterity in placing so many Wheels and Axles in so small a compass (for some French Watches do not exceed the compass of a farthing) then in making Clocks and greater Machines.

The

The Emperour *Charls* the fifth had a ^{Caus.} Watch made in the Collet or Jewel of a ^{Hier.} Ring; and King *James* had the like: and one *Georgius Caput Blancus*, or *George Whitehead* was expert at making such knacks at *Vicenza* in *Italy*, as *Schottus* tells us in his *Itinerary* of that Country.

Andrew Alciat the great Civilian of *France*, had a kinde of a Clock in his chamber, that should awake him at any hour of the night that he determined, and when it struck the determined hour, it struck fire likewise out of a flint, which fell among tinder, to light him a candle: it was the invention of one *Caravagio* of *Sienna* in *Italy*.

In some Towns of *Germany* and *Italy*, there are very rare and elaborate Clocks to be seen in their Town-Halls; where- in a man may read *Astronomy*, and never look up to the skies.

*Sydereos vulsus, Cantataq; vatibus Astra,
Non opus est Cælo querere, quare domi.*

So *Grotius* of these Globes.

In the Town-Hall of *Prague*, there is a Clock that shews the annual and periodical motions of the Sun and Moon, the names

names and numbers of the moneths, days and Festivals of the whole year, the times of the Sun-rising and setting, throughout the year, the *Æquinoxes*, the length of the days and nights, the rising and setting of the 12 Signes of the Zodiack: The age of the Moon with its several *Aspects* and Configurations; as *George Bruy* describes it in *Theatro Urbium*.

But the Town of *Sraesburgh* carries the bell of all other steeples (of *Germany*) in this point. A Scheme of the *Straßburg* clock you may finde in *Coriats Travels*, with a full description thereof: it was made by one *Conradus Dasypodius* a German, and Professor of the Mathematics in that City.

*Mich. Ne-
ander
Greg.*

*L. de Ma-
gnete.*

One *Linus* a Jesuite of *Liege*, and an Englishman by birth (as *Kircher* tells me) had a Phial or Glass of water, wherein a little Globe did float, with the four and twenty Letters of the Alphabet described upon it, and on the inside of the Globe was an Index or Stile, to which the Globe did turn and move it self, at the period of every hour, with that letter which denoted the hour of the day successively, as though this little Globe kept pace and time with the heavenly motions,

motions, *Gaßend. de vita Peyresci.*

Kircher above mentioned had a Vessel of water, in which, just even with the height and surface of the water, the twenty four hours were described; upon the water he set a piece of a Cork, and therein some seeds of a certain *Heliotrope* flower, which (like the flower it self) would turn the cork about, according to the course of the Sun, and with its motion point the hour of the day, *ibid.*

In that famous Stable of the Duke of Saxony at *Dresden*, there is a Room furnished with all manner of Saddles; among the rest, there is one that in the Pommel hath a gilded head, with eyes continually moving; and in the hinder part thereof hath a Clock, as *M. Morison* (an eye witness) relates in his Travels.

Of a portable Clock or Watch, take this ensuing Epigram of our Countryman *Thomas Campian, de Horologio Portabili.*

Temporis interpres parvum congestus in orbem.

Qui memores repetis nocte dieq; sonos.

Us semel instructus jucundè sex quater horas

Mor.

Mobilibus rotulis irrequietus agis.

*Nec mecum (quocumq; feror) comes ire
gravaris*

Annumerans vitæ damna, levansq; meæ:

Translated
H. V.

**Times-Teller wrought into a little
round,**

**Which count'st the days and nights
with watchful sound ;**

**How (when once fixt) with busie
Wheels dost thou**

**The twice twelve useful hours drive
on and show.**

**And where I go, go'st with me with-
out strife,**

The Monitor and Ease of fleeting life.

But the exactest Clocks and Watches that are, are defective, and want correction ; for in Watches, the first half hour goes faster then the last half, and the second hour is slower then the first, and the third then the second ; the reason whereof is, because Springs when they are wound up, and then begin their motion, move faster in the beginning then in the ending ; as it is with all violent motions. But in Clocks it happens contrary ; the last half hour is faster then the first, because

cause the weights by which they move, move slowly at first, as all ponderous things do, but accelerate their motion when they draw nearer to the earth. Besides, the lines or cords by which the weights do hang (being drawn out into some length) add some weight to the plummets, and consequently some speed to the motion. Both which inconveniences *William Landgrave of Hessen*, and *Tycho Brahe* took into consideration how to rectifie, as *Tycho* relates; but how they sped in the enterprize, he doth not tell us:

CAP.

C A P. I I.

ΣΦΑΙΡΟ-ΠΟΙΗΤΙΚΗ:

O R,

Some curious Spheares and
Representations of the
World.

ARCHIMEDES of *Syracuse* was the greatest Mathematician and the rarest Engineer that was in his time, or hath been ever since (as 'tis believed) both for the *Rational* and *Chirurgical* part, the *Theory* and the *Practick* of the Mathematicks. *Cicero* calls him *Divinum ingenium*, 2^o *de natura Deorum*. He was not only, *Cæli Syderumque Spectator assiduus* (as *Livy* speaks of him) a diligent Spectator of the heavenly Orbs and their Motions; but also *Cyclorum & Staticorum indagator acerrimus*, as the same *Livy*, a great Experimentator

mentator and devisor of Machanical Motions and Inventions. He was the first, *qui stellarum errantium motus in Spharam illigavit*, saith Cicero, 1^o Tuscul. that made a Sphear and an artificial heaven, wherein he did represent the rotations and revolutions of the Planets, and that with as true time and measure as they perform the same above. Of this Sphear *Claudian* hath an Epigram that acquaints us with some thing of the Fabrick of it.

*Jupiter in parvo cùm cerneret
æthera vitro;*

*Risit, & ad superos talia dicta refert.
Hucine mortalis progressa poten-
tia cura ?*

*Fam meus in Fragili luditur
orbe labor.*

*Fura Poli, Rerûmque fidem, Le-
gèsquo Deorum,*

*Ecce Syracusius Transtulit
arte Senex *.*

*sc. Archi-
medes.*

*Inclusus variis famulatur Spiri-
tus astris,*

*Et vivum certis motibus urget
opus.*

*Percurrit proprium mentitus signifer
annum,*

Et

*Et simulata novo Cynthia mense
redit.*

Translated thus by Mr Nathaniel Car-
penter in his Geography.

In a small Glass when *Jove* beheld the
skies,

He smil'd, and thus unto the Gods re-
plies ;

Could man extend so far his studious
care,

To mock my labours in a brittle
sphere ?

Heavens Laws, Mans Ways, and Na-
tures Sovereign Right

This Sage of *Syracuse* translates to
fight.

A soul within on various Stars attends,
And moves the quick Work into cer-
tain ends ;

A feigned Zodiac runs its proper year,
And a false *Cynthia* makes new
months appear.

And now bold Art takes on her to
command,

And rule the heavenly Stars with
humane hand.

Who can admire *Salmonus* harmless
Thunder,

When a slight hand stirs Nature up to
wonder ?

This

This is mentioned also by *ov. 6. Fast.*

*Arte Syracosia suspensus in aere clauso
Stat Globus, immensi parva figura poli.*

From that description of *Claudian*, we observe first, That this Machin did move of it self, it was an *Automaton*, a self-moving device; and which moved regularly by certain laws,

Et vivum certis, motibus urget opus.

As the Poet saith. 2. We learn from him, that these motions were driven and acted by certain *Spirits* pent within,

Inclusus variis famulatur spiritus astris.

About which spirits *Kircher* hath often beaten his brains, what to make of them, that he might know what was the inward principle of motion in that machin: But after all his study and scruting, he could never find it out, but he contends that the Circles of that Sphear were of brass, and the out-side (only) was of glass or specular stone, which the Poet might call *vitrum*, glass, for the perspicuity of it.

Yet Authors do make mention of a Sphear of glass which *Sapor King of Persia* had, which was so large, that he could enter within it, and sit in the midst of it, and see the Sphears and Planets whirling round about him; which did swell him

D

with

with such a conceit, that in his Letters he did use this stile, *Rex regum Sapor, Particeps Syderum, Frater Solis & Luna.*

Paulus Jo-
vim Sa-
bellicus. We read of a silver Heaven sent by the Emperour *Ferdinand* for a Present to *Soliman* the grand Signior, which was carried by twelve men with a book along with it that shewed the use of it, and how to order and keep it in perpetual motion. *Du Bartas* makes mention of both, and concludes his description of them with this Rapture touching humane wit.

*O compleat Creature! who the starry
Sphears*

*Canst make to move, who'bove the hea-
venly Bears*

*Extend'st thy power, who guidest with
thy hand*

*The days bright Chariot, and the bea-
venly brand.*

Kercher doth highly extol and admire the Artificers of this latter age for making Sphears and Globes, and such representations; who can make them (saith he) with such exactness and perfection in all points, that *Jupiter* might have juster cause to complain of them, then he did of *Archimedes* (in *Claudian*) for their presumptuous emulation of his handy-works.

Among

Among the Moderns, one *Cornelius van Drebbel* a Dutchman of *Alcmar*, may deserve just admiration: This man lived here in *England*, and was *Regi Jacobo à Mechanicis* (as one saith) King *James* his Engineer, he presented the King with a rare Instrument of perpetual motion, without the means of Steel, Springs, or Weights; it was made in the form of a Globe, in the hollow whereof were Wheels of Brass moving about, with two pointers on each side thereof, to proportion and shew forth the times of dayes, moneths, and years, like a perpetual Almanack; it did represent the motions of the heavens, the hours of Rising and Setting of the Sun, with the Signe that the Moon was in every 24 hours, and what degree the Sun was distant from it; how many degrees the Sun and Moon are distant from us day and night, what Signe of the Zodiack the Sun was in every moneth; it had a circumference or ring which being hollow had water in it, representing the Sea, which did rise and fall, as doth the flood, twice in 24 hours, according to the course of the Tides. This *Bezaleel* was sent for to the Emperour of *Germany*, who sent him a chain of gold:

A rude Scheme of this Instrument may be seen upon paper in *Mr Tho. Tims Philosophical Dialogue*, *Dignus rex Archimede isto altero; Dignus Archimedes Batavus magno illo rege*, as *Marcellus Frankheim* (another Dutchman) speaks of King *James* and his Engineer, in his Epistle to *Ernestus Burgravius*. Of this Microcosme or Representation of the World which we now mentioned, the excellent *Grotius* hath framed this Epigram following.

*In organum motus perpetui quod
est penes Maximum Britannia-
cum Regem Jacobum.*

*Perpetui motus indelafata potestas
Absq; quiete quies, absq; labore labor,
Contigerant cælo, tunc cum Natura caducis,
Et solidis unum noluit esse locum.
Et geminas partes Luna disspescuit orbe,
In varias damnans inferiora vices.
Sed quod nunc Natura suis è legibus exit
Dans terris semper quod moveatur opus?
Mira quidem res est sed non nova (maxime
Regum)*

*Hoc fieri docuit mens tua posse prius.
Mens tua qua semper tranquilla & torpida
nunquam,
Tramite constanti per sua regna meat.*

*Ut tua mens ergò motus cælestis Imago :
 Machina sic hæc est mentis Imago tua.*

Translated thus.

The untired strength of never-ceasing
 motion,

A restless rest a toyl-less operation,
 Heaven then had given it, when wise Na-
 ture did

H. V.

To frail & solid things one place forbid ;
 And parting both, made the Moons Orb
 their bound.

Damning to various change this lower
 ground.

But now what Nature hath those Laws
 transgress,

Giving to earth a work that ne're will
 rest :

Though 'tis most strange, yet (great King
 'tis not new ;

This Work was seen and found before in
 You.

In You, whose minde (though still calm)
 never sleeps,

But through your Realms one constant
 motion keeps :

As your minde (then) was Heavens type
 first, so this

But the taught *Anti-type* of your mind is.

One *Fanellus Turrianus* a Citizen of *Cremona*, made brazen heavens in imitation of those of *Archimedes*, and far surpassing them for Art, saith *Gaffarellus* in his book of *Curiosities* ; and *Ambrose Morinus* in his description of *Spain*. *Erasmus* had a golden Ring given him by one of the Princes of *Germany*, which being explicated, was a perfect celestial sphear, just of that form we call the *Armillary sphear*, as we read in his life.

Fanellus before mentioned did recreate the Emperour *Charls* the fift (when he had resigned up his Empire, and retired to a Monastique life in *Spain*) with ingenious and rare devices : Oftentimes when the cloth was taken away after dinner, he brought upon the board little armed Figures of Horse and Foot, some beating Drums, other sounding Trumpets, and others of them charging one another with their Pikes. Sometimes he sent wooden Sparrows into the Emperours Dining room, that would fly round about, and back again ; so that the Superior of the Monastery coming in by accident, suspected him for a Conjuror. He framed a Mill of Iron that turned it self, of such subtile work and smalness, that

a Monk could easily hide it in his sleeve; yet would it daylie grinde so much wheat as would abundantly serve eight persons for their days allowance. This was he who made the Water work, which by a new Miracle of Art, drew up the River *Tagus* to the top of the Mountain of *Toledo*. All this we have from *Famianus Strada's* excellent History of the *Lein Country Wars*.

CAP. III.

'ΑΤΤΟΜΑΤΟ-ΠΟΙΗΤΙΚΗ',

Of sundry Machins, and Artificial Motions.

Wisd. 7, 10
 Θεός αἰεὶ
 γαμεῖται.
 Plutarch
 Sympos. 1.
 8. q. 2.

GOd framed the world by Geometry (as we may say) that is, with wonderful Art; he did all things in Number, Weight, and Measure. *Aristotle* calls him *Νευγαβάστην τοῦ κόσμου*, The great Engineer of the world, that tacked this rare *Systeme* of heaven and earth together, tackt the Center to the Sphears, and made the whole Frame to move in a wonderful order from its first creation to this day. The earth is a rare piece of his Staticks, being hanged upon nothing, as *Job* saith, *Job* 26. 7. it hangs in the very Center and middle of the world, like a Ball in the Ayr, but fixt and immovable, being evenly ballanced and counterpoized with its own weight: *Ponderibus librata suis*.

Ov. Met.
 l. 1.

suis. So those pendulous Mountains (the Clouds) whose ballancings that great Philosopher *Job* admired, *Job* 37. 16. and those fiery Mountains (the Comets) are Gods *Ichorropica*, and some admirable parcels and pieces of his *Mathematiques*. But the whole Machin of the world being taken in the entire frame and fabrick of it, is a greater wonder then all other wonders in the world, as *St Augustine De Civit.* gives his judgement. This is a kinde of ^{h. 11.} an *Automaton* or Engine that moves of it self, much like a great Clock with wheels and poyzes, and counterpoyzes, that is alwaies in motion, though no body moves it.

For I cannot believe that the Angels (those glorious creatures) are tyed to the heavenly bodies (like dogs in a wheel) to give them motion, but that that great Engineer which made them, gave them a seeing or motion at first, that continues to this day, and will continue so long as the Sun and Moon endureth.

As the great world is an *Automaton*, so is the little world (man) a sort of a self-moving Engine, that performs its several motions by certain Springs, and Wheels, and Chords that are acted by one secret principle

principle of all motions, to wit, the heart and spirits therein contained, and which are from thence dispersed through the whole frame of the work.

Mens agitat molem, & parvo se corpore miscet.

Now it is observed, that the wit of man by a diligent and attentive perusal of the world and himself, hath framed sundry useful Machins and artificial motions, after those patterns, after the frame and model of those two primary *Automata* that God himself made. A Mill was first made after the pattern of a man's mouth, as *Seneca* tells us in his ninth Epistle; An Organ pipe had its pattern from mans weazand, which is inspired with the Lungs, and many other Inventions have been hinted unto us from the Organs of mans body, and the actions performed by them.

For Engineers, such as were expert in the practical part of the Mathematiques, these were the most renowned in ancient times. *Archimedes* of Syracuse, *Architas* of Tarentum, *Severinus Boetius* of Rome, *Proclus*, *Heron*, and *Ctesibius*, both of *Alexandria*, of later times, *Régimontanus*

rdy/ov
ce/Py o
Arthar-
r@.

tanus of *Norimberg*, *Simon Stevinus* of lower Germany, *Cornelius van Drebbel* his Countryman, whom we mentioned before, *Athanasius Kircher* by birth a German, but living (of late) in *Rome*, and *Marinus Marfennus*, a Frier of *Paris*. These were *Magi* and *Thaumaturgi Mathematici* wonder-workers, or such as performed marvellous feats by their great skill in Mathematical Sciences.

Cassiodorus a grave learned man, and Secretary to *Theodorick* King of the Goths, gives this character of the above-named *Boetius* in a certain Letter written unto him: *You know (saith he) the secrets of Nature, and can work wonders by your Art, Metals do bellow and make a noise: Diomedes cast in brass, sounds his Trumpet louder; Here the brazen serpent hisses, and there artificial Birds (that had no voice) sing melodiously; yet these are but trivial things to relate of him, who can imitate the motions of the heavens here on earth.*

All artificial motions (generally) are performed by *Ayr*, or by *Water*, and so all Engins, at least such as move of themselves, are (or may be) divided in *Spiritualia & Aquatica*. *Heron of Alexandria* writ books *de spiritalibus Machinis*, or wind

wind motions or machins moved with the ayr or wind: and *Paptista Porta* hath some thing *de pneumaticis experimentis*, or wind-motions, in his fifth book of Natural Magick, and *Martinus Merfenus* hath written *Phænomena pneumatica*. I will here produce some instances or examples of both kindes, and first of *pneumatic* or wind motions.

De
Spiritibus Machinis,
 Or
 WIND-MOTIONS.

OF this kinde (I conceive) was that Wooden Dove of *Architas*, which he made to fly in the Ayr, which was by the means of Ayr pent or inclosed within, which in the motion being something rarified, kept it up aloft, and with some wheels contrived in the concavity thereof, did set it forward; so *Aulus Gellius* gives us some hint of the contrivance of it; *Ita erat libramētis suspensum, & aurâ spiritûs inclusa, & occulta consitum,*

constitum, &c. *Julius Scaliger* understood the feat full well (it seems) for he professeth the skill to make the like with a wet finger, as we say. By the same art did *Regiomontanus* make a wooden Eagle ^{Exercit.} to fly from *Norimberg* to meet the Em- ^{contra} perour on his way thither; and when it ^{Gardan.} met him, it hovered over his head with a Tonick motion, and then returned along with him the same way that it came.) The Iron Fly was the like device, made by the same *Regiomontanus*, which springing from under his hand, would fly round about the room with a humming noise, and then return back under his hand again.

Simon Stevinus a Dutchman, made a chariot to go with sails, which was as swift almost as the wind that drove it; for it would carry eight or nine persons from *Scheveling* in Holland to *Pussen* in two hours, which was the space of forty miles and upwards.

Monfieur Peyresc, a learned Antiquary of *France*, made a journey to see it, and was in it, and did use ever after to mention it with wonder, as *Glassendus* tells us in his life: It was made in fashion of a boat with four wheels, two sails, and a stern.

stem. *Grotius* hath excellent Poems in commendation of that Invention, two of the concisest I thought good to insert here,

In currus veliferos.

*Ventivolam Typhis deduxit in aquora na-
vem:*

*Jupiter in terras, aethera m̃q; domum
In terrestre solum virtus Stevinia, nam nec
Typhy tuum fuerit, nec Jovis istud opus.
Aliud in eisdem.*

*Haecenus immensum Batavi percurrimus
aquor,*

Oceani nobis invia nulla via est.

1. *Mare. Nerea Cattorum soboles consumpsimus o-
mnes*

Fam nihil est ultra, velificatur humus.

Translated

Typhis to Sea the first Ship brought, and
Fove

To heaven, where *Argo* now a star doth
move:

But first by Land in Ships *Stevinus*
went:

For that, nor *Fove*, nor *Typhis* did in-
vent.

Another

Another.

The vast Sea hitherto the Dutch have
sail'd

Search'd every Coast, found each point,
and prevail'd;

The Ocean's all made pervious by their
hand,

Now nothing more is left, they sayl by
land.

We read that in *China* and the Island
of the *Philippines*, there are the like devi-
ces, as *Boterus* relates in *Politia Illustri-*
um; and *Hondius* in his Map of *China*
hath a type thereof; so that now we sail
on the land, and on the water, and under
the water too; and an ingenious Gen-
tleman of this Nation talks of sayling in
the Ayr too (in a flying Coach) which he
conceives to be feasible, and promises
some attempt that way.

Celcius Rhodiginus relates, that the *Æ-*
gyptians had made some Statues of their
Gods, both to walk of themselves, and
also to utter some words articulately:
For their motion, it must be ascribed to
some wheels and springs within, like the
contrivances of *Dadalus* his Statues, and
Vulcan's Tripodes: But for their voice
or speech, it must be ascribed unto some
Ayr

Ayr forced up through some pipes placed in the heads and mouth of these Statues. So we must conceive of the artificial Lions that roared like the natural ones; and the artificial Birds that imitated the voices and tunes of real Birds, which *Luit-Prandus* saw at *Constantinople* in the Emperours palace, when he was sent thither upon an Embassie from *Berengarius* King of the Lombards, *Anno Dom. 950.* as the said *Luit-Prandus* relates in the sixth book of his History. Such was that Statue of *Albertus magnus* which spake to *Tho. Aquinas*, and that brazen head of *Roger Bacon* a Carmelite Friar of *Oxford*, and perhaps that Image that *Sir Richard Baker* saith was made by Necromancy in the time of *Richard* the second, and not long before the Parliament that wrought Wonders, as Histories speak; which Image uttered at an hour appointed these words, *The head shall be cut off, the head shall be lift aloft. the feet shall be lift up above the head:* *Sir Richard Baker* in the life of *Rich. 2.*

Gornelius van Drebbel that rare Artist we spake of, made a kinde of an Organ that would make excellent Symphony of its self, being placed in the open Ayr and clear

clear Sun, without any fingering of an Organist; which was (as we conceive) by the means of Ayr inclosed, and the strictures of the beams rarifying the same; for in a shady place it would yeild no Musick but where the Sun-beams could play upon it, as we read of *Memnons* Statue that would make some kinde of Harmony when the Sun did beat upon it; whereof we speak more hereafter.

At *Dantzick* a City of *Prussia*, *M^r Morison*, an ingenious traveller of this Nation, saw a Mill which (without help of hands) did Sawe boards, having an iron wheel, which did not only drive the sawe, but also did hook in, and turn the boards unto the Sawe. *D^r John Dee* makes mention of the like which he had seen at *Prague* in his preface to *Euclide*; but whether the Mill moved by wind or water, they do not mention: We heard of the like device set up in Kent here in England, and some other places.

Archimedes his Sphear was some *pneumatical* Engine, that moved of it self by means of some inclosed Spirits, as appears by that Verse of *Claudian* in the description of it.

Inclusus variis famulatur spiritus Astris:

E

There

There are certain *Aeolii Sclopi*, or wind-muskets that some have devised to shoot bullets withal, without powder, or any thing else, but wind comprést into the bore thereof, or injected with a spring (as boys use to shoot pellets with Elder-guns, by breathing air into them) which will shoot with as great force as powder.

Aeolia pila (which by contraction they call *Aeolipiles*) are also of this kinde, which are little things made of brass or copper in the form of a ball, or pear, or bellows (but concave) with a little small hole; these being filled with water (which they do by heating them in the fire, then throwing them into water) and then being set near the fire, the water rarifies into air, the air being scanted of room bursts out with great violence, and for a long season. They are used by *Chymists* to blow their coals with, as I have heard, and by some others to excite heat for melting of glass and mettals, and are called by some *the Philosophical bellows*.

A spit may be turned as *Cardan* shews, without the help of weights or hands, by the motion of ayr rarified by the fire, and ascending up the chimney, only a pair of sails must be placed in that part of the chimney

Baptista
Portal. 8.
Mag. Nat.

chimney where it begins to be narrow, and a wheel below, to the Axis whereof the spit-line must be tyed ; the ayr so ascending will turn the wheel, and the wheel the spit, as long as there is any fire in the chimney.

De
AQUATICIS MACHINIS,
Of
WATER MOTIONS.

Our ordinary Water mills that move by the force of water, are an excellent invention, if we consider the various implements that belong unto them, and with how little labour they are kept up to perform their work, when they are once set in order.

I will shew you (saith *Rodulph Prince of Camerino* to the Duke of *Anjou*) two stones that do excel all in your Cabinet, and shewed him two Millstones. These cost but ten florins, said he, and they bring two hundred florins yearly. But the Mill

*Itiner.**Galto Belg*

called the *Basacle* at *Thelous* in *France*, is a Machin of more then common art, as *Abraham Golnitz* (that saw it) tells us; It is a thing worth your seeing (saith he) for there is not such another in all *France*: So is that at *Dantzick* in *Prussia*, which hath eighteen rooms, and brings a gold gulden of profit every hour to the publique Treasury, saith *M^r Morison* in his Travels.

At the Mint of *Segovia* in *Spain*, there is an Engine that moves by water so artificially made, that one part of it distendeth an Ingot of gold into that bredth and thickness as is requisite to make coyn of; it delivereth the plate that it hath wrought unto another that printeth the figure of the coyn upon it, and from thence it is turned over to another that cutteth it (according to the print) in due shape and weight; and lastly, the severall pieces fall into a reserve in another room, where the Officer (whose charge it is) findeth treasure ready coyned, as a noble and learned Gentleman of this Nation in his Treatise of *Bodies* relates.

Sir K. D.

The Italians make rare devices by the motions of water; In the Duke of *Florence* his garden at *Pratolino*, is the picture
of

of *Pan* sitting on a stool with a wreathed pipe in his hand, and *Syrinx* beckning unto him to play on his pipe: *Pan* putting away his stool and standing up, plays on his pipe; this done, he looks on his *Mistress*, as if he expected thanks from her, takes his stool again, and sits down with a sad countenance.

There is also the Statue of a Landress beating a buck, and turning the clothes up and down with her hand, and the battledor wherewith she beats them in the water. There is the Statue of *Fame*, loudly sounding her Trumpet; The picture of a Toad creeping to and fro, and a Dragon bowing down to drink water, and then vomiting it up, with divers other knacks of wonder and delight, as *Mr Morison* relates.

At *Tybur* or *Tivoli* near *Rome*, in the Gardens of *Hyppolitus d'Este* Cardinal of *Ferrara*, there are the pictures of sundry Birds on the tops of Trees, which by Hydraulic art and secret conveyances of water through the trunks and branches of the Trees, are made to sing and clap their wings, but at the picture of an Owl appearing suddenly out of a Bush, they are all mute and silent, as *Schottus* in his

Itinerary of *Italy*. It was the work of *Claudius Gallus*, as *Possevin* informs in l. 15. of his *Biblioth. select.* c. 1.

There are in sundry places of *Italy* and elsewhere, certain *Organa Hydraulica*, that is, Organs that make good Musick of themselves, only by forcing the water up the pipes, and by the collision of the Ayr and Water therein: The lower part of the pipes are placed in the water (as *Petrus Victorius* describes them) which water being forced up with a scrue, or such device, doth inspire the pipes, as well as the wind that is made with a bellows. Among the water-works in the Duke of *Florence* his garden, there was an Hydraulic Organ that with the turning of a cock would make sweet harmony, as Mr *Morison* relates; the invention is ancient, for *Ammianus Marcellinus* makes mention of one l. 14. and *Claudius* describes one thus in his Poem *de consulatione Mallii Theodori*.

*Et qui magna levi detrudit murmura tactu
Innumeras voces segetis moderatus Aëne
Intonat erranti digito, penitusq; trabali
Veste, laborantes in carmina concitat undas.*

Which

Which invention is by some ascribed to *Ctesibius*, an ingenious Artist of *Alexandria*, by others to *Archimedes* of *Syracuse*, as *Tertullian* writes, of which he speaks thus, *Specta potentissimam Archimedis munificentiam (scilicet) Organum Hydraulicum, tot membra, tot compagines, tot partes, tot itinera vecum, tot compendia sonorum, tot commercia Nodorum, tot acies tibiarum, & una moles erant.*

In those Roman spectacles or publick shews exhibited by the Roman Emperours, we read of divers rare devices, and artificial motions, some whereof may not improperly be inserted in this place.

There were Amphitheaters both at *Rome* and *Verona*, and elsewhere, which were prodigious piles, both for magnificence of cost, and inventions of Art; whole groves of great Trees (with green branches) were brought and planted up on the sandy Theater, and therein a thousand Estridges, a thousand wilde Boars, and a thousand Stags put in for the people to hunt. This Forrest being removed, they would on a sudden overflow all with a deep Sea, fraught with Sea monsters, and strange Fishes; then might you see a Fleet of tall Ships ready rigged and

*Insana
Moles.*

appointed, to represent a Sea-fight: then all the water was let out again, and Gladiators or Fencers fight, where the Gallies stood but even now; which things are expressed in verse by *Juvenal* in his third *Satyr* thus:

——— *Quoties nos descenditis Arena
Vidimus in partes, ruptâq; voragine terra
Emersisse feras & iisdem saepe latebris
Aurea cum Croceo creverunt Arbusta libro?
Nec solum nobis Sylvestria cernere monstra
Contigit, Equoreos ego cum certantibus
Ursis
Spectavi vitulos & equorum nomine dignū
Sed deforme pecus*———

Translated by *H. V.*
How oft have we beheld wilde Beasts
appear
From broken gulfs of earth, upon some
part
Of sand that did not sink? How often
there
And thence did golden boughs ore saf-
fron'd start?
Nor only saw we monsters of the wood,
But I have seen Sea-Calves whom Bears
withstood;

And

And such a kinde of Beast as might be
named

A horse, but in most foul proportion
framed.

Sometimes they caused a steep mountain to rise in the midst of the Amphitheater, covered with fruitful Trees, with streams and fountains of water gushing out : sometimes a tall Ship would float up and down of its self, which splitting asunder, would disgorge five or six hundred beasts to be baited, then vanish away : sometimes odoriferous waters would spout out to bedew the people, and refresh them with the scent ; sometimes they would represent the Fable of *Orpheus*, and then the Trees must move up and down, as the Poets fame they did when *Orpheus* played on his Harp.

Reserunt scopuli, mirandaq; sylva cucurrit Mart.
Quale fuisse nemus creditur Hesperidum Epig. 23.
Affuit immixtum pecudum genus omne
ferarum

Et supra vatem multa pependit avis.

The Rocks did creep, vast Woods did
strangely move,

Such

Such ('tis believ'd) was the *Hesperian*
Grove;

Wilde Beasts and tame profusely came
to fight,

And ore the Poets head, birds did alight:

So *Martial* speaks of this representation
by *Domitian* the Emperour, wherein
those things were really performed on
the Theater, which the Poets had but
fabled, as he saith,

Quicquid fama canit donat arena tibi.

Which motions were performed per
Machinamenta Neugardiana, as *M^r Farnaby*
conjectures in his Annotations, or by
men placed in the hollows of the Trees
and Rocks; but in this creeping Forrest
there were beasts of all kinds among the
trees, and birds on the tops of them, all
attentively listning to the ravishing har-
mony that was made by some Musician
that did personate the Thracian Lutinist.

Epist. 90.

In Rome there were *versatilia Cœnatio-
num Laquearia*, as *Seneca* tells us, that is,
certain dining chambers made with that
art, as if they were moveable Scenes;
for whilst the guests sate at Supper, they
should be turned about to several rooms
adorned with differing furnitures; at eve-

ry new course of meat, they should be transported into a new chamber; they sitting still all the while in their seats, *Sen. Ep. 20.*

That *Plicatilis domus*, that portable Palace made of Wood by *Henry the 8th*, and carried over to *France* to that famous interview that he had with *Francis the first*, was a work of great magnificence and art, and much spoken of by forraign Writers, especially *Paulus Jovius*; and among our own, by my Lord of *Cherbury* in his History of that Prince, the model whereof was preserved, and was to be seen of late years (as he saith) in the Tower of *London*.

Of MEMNONS Statue.

MEMNON was a King of Egypt and in memory of him, there was a *Colossus* or mighty statue made of black marble*, and set up in that magnificent Temple of *Serapis* in *Thebes*. Called
Basilus.

It was made by the Theban Priests with such art and contrivance, that in the morning upon the striking of the beams of
of

of the Sun upon it, it made a kinde of Musick; it was so famous a piece, that men travelled from far to see it. *Lucian* the Sophister went to see that Miracle, as he calls it, as he relates in his *Philopseudes*; so did the Emperour *Severus*, as *Spartianus* tells us, and *Germanicus*, as *Tacitus*; and *Strabo* that judicious Geographer went to see it, and heard the Musick, and a great multitude of people at the same time with him; so did *Apollonius* of *Tyana*, as *Philostratus* relates.

This Colossus upon a certain earthquake that hapned, was broken in the middle, and yet it was as Musical as when it was whole, as *Strabo* affirms in the 10th of his *Geography*, and *Juvenal Sat.* 15: avers the same,

*Dimidio Magica resonant ubi Memnone
chordæ.*

This matter need not seem fabulous or incredible (nor will not saith *Natalis Comes*) to any that understand the power of Art and humane Wit, and how expert the Theban Priests were in Astronomy, and all other Philosophical Sciences, see *Pliny* hereof, l. 35. c. 7.

Ath. Kircher in his *Oedipus*, conceives it

it was a *Telesme*, or made by *Talismanic* * Who list
 Art, and that the Divil was conjured to know
 within the hollow of it to perform that more of
 effect, because it continued for so long a *Telesmes*
 time, namely to the time of *Apollonius* and *Talis-*
Tyanus, which from the first rearing of *manic* Art,
 it was about eleven hundred years. may read
Marfil.

Ficinus de
vita celi-
um comparanda l. 3. c. 18. *Joseph Scaliger* l. 3. *Epistola* 226. a. and
 learned M. Gregory his *Opuscula*, cap. 8.

But yet he shews, that such a Musical
 statue may be made by Mathematical
 and natural contrivance upon the ground
 of rarefaction: *magnam enim vim in na-*
tura rerum, rarefactionem obtinere, nemo
ignorat, saith he, *Tom. 2. Ord. Egypt.*
 where you may finde more examples of
 pneumatical devices among the *Ægypti-*
 ans in their Temples.

CAP.

CAP. IV.

ΓΡΑΜΜΑΤΙΣΤΙΚΗ:

O R,

*The Art and Mystery of
Writing, with the Instru-
ments thereunto belonging.*

AMong all the Inventions and produ-
ctions of humane Wit, there is none
more admirable and more useful then
Writing, by means whereof a man may
copy out & delineate his very thoughts
and minde, and make that visible which
none can see but he that made it; where-
by a man can utter his minde without o-
pening his mouth, and signifie his plea-
sure at a thousand miles distance, and this
by the help of four and twenty letters,
and fewer in some places; by various
joyning and combining of which letters,
as also by the transposing and moving of
them

them to and fro, all words that are utterable or imaginable may be framed; for the several combinations of these Letters and different ways of joyning them, do amount (as *Clavius* the Jesuite hath taken the pains to compute and observe) to 5852616738497664000 ways; so that all things that are in heaven or in earth, that are, or were, or shall be, that can be either uttered or imagined, may be expressed and signified by the help of this marvellous Alphabet, which may be described within the compass of a farthing.

*In sphaera
Joh. de
Sacro
bosco c. i.*

The *Chinois* have 40000 letters at least, as *Purchas* and others tell us, which makes the language so difficult, that a man cannot learn it in an age, which renders our Alphabet of 24 letters the more admirable.

Though the vulgarity and commonness of this art hath made it less esteemed and set by, yet wise and considerate men that look upon things *eruditis oculis* (as *Cicero* speaks) do much admire the Invention.

The Hebrews call it *Dick-Duk*, *inventum subtile*, a subtile and ingenious Invention: *Greg. Theologanus*, *Divinum Miraculum*, *l. 16. de Rep. c. 2.* a Divine miracle;

miracle; Cicero speaks of it with admiration, *Quis sonos vocis, qui infiniti videbantur paucis litterarum notis terminavit? l. I. Tuscul.* The Indians admired

*Purchas l.
8. of America.*

it not a little, when they saw the Spaniards send Letters to and fro, and maintain a kinde of a dumbe Commerce among themselves by this way; they fancied that these Letters were some Spirits that were the *Internuncii* or Interpreters between them.

*Tbo. Readi
inventa
Adeffota*

*Quisquis erat meruit sentit transcendere
metas*

*Et fati nescire modum, qui mystica
primus*

*Sensa animi docuit magicis signare
figuris. &c.*

So a modern Poet sings in commendation of it.

For the first Invention of Letters, the *Phœnicians* carry most voices.

*Phœnices primi (Fama si credimus) ausi
Mansuram rudibus vocem signare figuris.*

Phœnicians, that (if Fame we dare believe)

To Humane Speech first Characters
did give.

Among

Among the Phœnicians *Cadmus* had the honour of this Invention ; whence one calls letters *Φιδινικασματα Κάδμου* ; and another, *ingellas Cadmi filias*, the black and swarthy daughters of *Cadmus* : But *Auson. Epigr.* the truth is, they did but borrow them from the Hebrews, as all other Nations did ; though perhaps by adding some few, or varying and altering their form and character, they seem now to have different Alphabets, *Herm. Hugo.*

The *Librarians* of old, who lived by writing books which others had made, were very admirable in handling the pen as appears by ancient manuscripts, which are so neatly and artificially done as if they were printed. Some of the latter age have been excellent in this Mystery. One *Francis Alumnus* did write the Apostles Creed and the first fourteen verses of *S^t John's* Gospel, in the compass of a penny, and in full words, which he did in the presence of the Emperour *Charles* the 5th, and Pope *Clement* the 7th, as *Genebard* relates in his *Chronologie*, and *Sim. Maiolus* out of him, who had also in his own possession such a miracle (as he calls it) or the very same I believe, *Nos domi idem miraculum servamus*, these are

F his

his words in his 23^d Colloquy. *Pliny* hath a parallel example of one (whom he doth not name) that wrote all the *Iliad* of *Hommer* in a piece of Parchment that was so little, that it was contained in a Nutshel. *Cicero* and others mention the same, though *Lancelotti* puts it among his *Farfalloni*, and reckons it for one of the popular errors of *Pliny*.

I read of one *Thomas Sweicker*, a Dutchman, who being born without hands and arms, could write with his feet, and that elegantly; he could also make his pen with his feet, and many other feats, which I finde expressed in these verses.

Mira fides ! pedibus dextre facit omnia
Thomas

Cui natura Parens brachia nulla
dedit.

Namq; bibit pedibus, pedibus sua Fercula
sumit

Voluit & his libros preparat his cala-
mos.

Quin & litterulas pede tam benè pingere
novit

Artificis superet grammata Ducta
manu.

Maximus

Maximus hoc Cæsar stupuit quondam Maximili-
an the Em-
perour.
*Æmilianus **

Donaq; scribenti largus honesta dedit.

The Duke of *Saxony* doth keep some Copies of his Writing among his *περὶ ἁλῶν*, or Rarities, as *Fel. Pläterus* relates in his observations. There was a woman in this Kingdom of late years that could write with her feet, and do many other things to the wonder of the beholders, and went about the Kingdom.

Besides the common way of Writing, there are some mysteries and secret ways, and that either by abbreviation, setting a letter for a word, and a word for a sentence for brevity sake, as the Hebrews and Romans anciently used to do; or else by using different characters from the common and vulgar ones, such as none can read or understand but the author or deviser of them, and such as he is pleased to impart the mystérie to, and give him a key to decipher and open the secret by; which sort of characters the Ancients used to call *Furtivas notas*, and *Sifras*, and *Ziglas*, and the Art it self *Ziglography* and *Brachygraphy*, it is very useful for two respects,

1. For haste and brevity.

2. For privacy and secrecy.

1. For brevity and expedition ; it is a good way to take a speech or a sermon, or any thing else that is dictated, as fast as it is spoken ; hereby the Notaries hand will keep pace with the speakers tongue, and out-strip it too ;

*Mart. l. 14. Currant verbalicet, tamen est velocior
illis,
Nondum lingua suum, dextra peregit
opus.*

*L. 5. This is scribere διὰ σημείων, as Cicero
Ep. 13. l. 5. ad Atticum. Dion ascribes
the invention to Mecænas,*

Πρῶτος σημεῖα γραμμάτων τίνα πρὸς ταχὺς ἔθηκεν.
He first found (saith he) thele Abbrevia-
tures and compendious way of Writing
for expeditions sake.

*Manil. l. 4. Astron. Hic eris & fœlix scriptor, cui litterum
verbum est,*

*Quiq̃ notis linguam superet, cursumq̃
liquentis,
Excipiat, longas nova per compendia
voces.*

2. This *Ziglography* is useful for se-
crecy or privacy *ad elusionem examinis* ;
for hereby a man may carry a letter open
in his hand, and understand never a word
of

of it; and they that make no Religion of opening letters, finde themselves deluded; which is of good use in time of war, and at other times against paper-pyrats that lie in wait for such poor booties; *Quod ad te de decem legatis scripsi, parum intellexit credo, quia diu Conqueſcor ſcripſeram*, ſaith *Cicero* to his friend *Atticus*, who did not underſtand all the letter that *Cicero* had written unto him, becauſe he had written part of it in characters.

Julius Caesar had found out ſuch a device for ſecrecie, *ſic ſtructo litterarum ordine ut nullum verbum effici poſſet*, he did ſo tumble, invert, and tranſpoſe the Alphabet in his writing, that no man could pick any ſenſe out of it; and this he deviſed when he began to think of the Roman Monarchy, and was by him uſed but to private and tryed friends that were his confederates, and privie to his Deſigne.

*An Appendix of the Instruments
of Writing.*

THe Instruments of Writing are either 1. *Active*, or 2. *Passive*. That is, either the Instruments *wherein* we write, or *wherewith* we write.

The instruments *wherein* we write are divers; as Stone, Brass, Wax, Lead, Barks and Leaves of Trees, Paper and Parchment.

The first Writing that we read of was in *stone*, God did write the Law in two Tables of Stone, *Exod. 19.* which *Salvian* calls *Rupices paginas*. *Moses* wrote in *Saphyr* and *Onix*, *Exod. 28. 10.* *Saxo Grammaticus* speaks, that the Danes did record the noble Acts of their Ancestors in verse, which were cut in stone, *in saxis ac rupibus* (as he saith) *voluminum loco, vastas moles amplectebantur, codicum usum à cautibus mutuantes. Apud Seldenum.*

*Marmora
Arundell.*

*—Foliiſque
notas &
carmina
mandat.*

*Virg. 3.
Æn.*

The Sybils books were written in the leaves of Trees; the Indians of the west do write in the leaves of the Plane tree, which are as broad as any sheet of paper, and

and four times as long, saith *Fos. Acosta* l. 4. cap. 21. So in *Malabar*, and other parts of the *Levant*, they write in the leaves of the *Palm*, as the *Syracusians* did in an *Olive leaf*; from which manner of *Writing* the pages of books are termed to this day *folios* or leaves.

The ancients used also to write in sheets of lead; this is intimated by *Job*, *O that my words were graven with an Iron pen, and lead in the rock for ever, Job 19. 23.*

The Poems of *Hesiod* call'd *Ἡσιόπου* were found in *Bæotia* written in plates of lead, saith *Pausanias* in *Bæoticis*. There was a common manner of writing also in thin rindes of trees growing under the upper bark, which is called by the Latines *Liber*, or *Caudex* & *Codex*.

Udoq, docent inolescere libro,

Virg. Georg. l. 2.

Whence books are called *Libri* and *Codices*; for *liber* properly is *interior tunica corticis quæ ligno coheret in quâ antiqui scribebant*, as *Isidor* defines it. The *Indians* of the *East* used such a kinde of writing, as *Q. Curtius* mentions l. 8 *libri Arborum teneri, haud secus quàm Cera, litterarum notas capiunt*: They wrote also in the leavs of certain reeds, which *Isaiah*

called *papyr-reeds*, *Isa. 19. 7.* growing in the marishes of *Egypt*, which reed or sedge is called *Biblus* or *Byblos*, so *Lucan*,
Nondum flumineas Memphis contexere biblos

Noverat — Which the Translator doth english *papyr*.

The *River* yet had not with *papyr* serv'd
Ægypt. *The. May.*

From which term or name of *Biblos*, books are by the Grecians called *Bibloi* and *biblia* dimunitively; and that book of books the Bible; because books were usually made of this kinde of reed or sedge; and the manner was thus; they divided these leaves into thin flakes called *Phylira*, into which they naturally divide themselves, then laying them on a smooth table, and moistning them with the water of *Nilus* (which is of a glutinous nature) they placed one cross under the other, like a woof and warp in a weavers loom, & then having pressed them, they set them to dry in the Sun, as *Pliny* relates in *l. 13.* of his Natural History.

The Roman Laws called the Laws of the 12 Tables, were written in leaves, or tables of brass.

Smal boards or tables of wood waxed
over,

were in frequent use among the later Romans to write in, which were called *Cerei pugillares* in sundry Authors, and *Cerata tabulae* or *tabellae*, whence Letter-carriers were called *Tabellarii*. These were the Writing tables that *Zacharias* called for *Luke* i. 36. Write these things upon a table: *Isa.* 30. 8. *ἐν πύλλῃς* *Septuagint*, box tables. These boards were sometimes made of Box and Cedar-wood, whence that of the Poet *Persius*,

————— *Cedro digna locutus :*

He spake things worthy to be written in Cedar, and worthy of immortality. *Eumenes* King of *Pergamus* devised a way to dress the skins of beasts, and to make them fit for writing, as Vellum & Parchment. This latter is called *Pergamum*, from the Town of *Pergamus*, where it was first made. But the modern invention of paper surpasseth all in this kinde. My Lord *Bacon* reckons it *inter monodica artis* among the singularities of Art, as being a singular and excellent invention; *adeo ut inter materias artificiales vix inveniatursimile aliquid*, saith he, it is a web or piece of cloth that is made without a Loom, & without spinning or weaving. as a modern Poet is pleased to describe it,

Denique

*Deniq; compacta est nullo subtemine tela,
Exuperans candore nives, Etate
metella, &c.*

It derives its pedigree from the dung-hill, being made of rags, and things cast out of doors as useless; we do not go to the expence of making it of Cotton-wool, as the Mexicans do, but of nasty clouts; *Magnarum usque adeo sordent primordia rerum*; of so mean a birth and original is this commodity, *Quâ humanitas vita & memoria maximè constat, imo quâ hominum immortalitas*, as *Plin. lib. 13. cap. 11.* which *Grotius* describes thus:

*Nunc aurata comas, & sicco pumice
levis*

*Charta, senis scabri fascia nuper
eram.*

In some parts of the East they make paper of silk, as was to be seen in *Ferdinand Imperatus* his Cabinet of Rarities.

Now speak we of the active instruments, or those wherewith we write: The two Tables of the Law were written with a miraculous pen, to wit, Gods own finger: for writing in brass or lead they had certain Graving tools that were hollow, called by the Latines *calum* and *celtes*,

celses, from the hollownes thereof, In ^{καυλός} waxen tables they wrote with pointed ^{Calamus} bodkins of iron, steel, or brass called *stylus*; this was sharp at one end for to make impression in that wax; but it was flat and broad, and somewhat hooked at the other end, for to scrape or blot out the letter if need were. Men write in glass with pointed Diamonds, which yeild to be cut by nothing else, except the Smiris or Emeril.

In ancient paper made of seggs, they wrote with a reed called *calamus scriptorius* & *arundo*, which kinde of reed grew much about *Memphis* and *Cnidos*, and the banks of *Nile*.

Dat Chartis habiles calamos Memphitica Mart. l. 14.
tellus. Epigr. 38.

In parchment and the modern paper, they write with a pen or quill pluckt from the wing of some Fowl, called by *Ausonius Fissipes*, from the slit that is made in it for to let down Ink, which is a very useful invention, and commended by an ingenious Muse of the Low Countries.

Præteritos reddit, præsentis prærogat Barleus de
annos, Penna.

Invidiamq;

*Invidiamq; feri temporis una domat:
 Absenti loquitur, laedit rostrata juveniq;
 Dumq; aliis vitā fænerat, ipsa caret.*

Past years it rescues, makes the present
 spread

To ages, and times envy striketh dead,
 Instructs the absent, hurts and helps at
 need,

And wanting life, makes others live
 indeed.

Opmerius makes mention of the three
 last in his *Chronicle*, *In pugillares scri-*
bebant stylis ferreis, in papyros autem arun-
dineis calamis & postmodum etiam avium
pennis; so he. Some write with coals,
 but the verse tells you who they are,

Stultorum calami carbones, mænia chartæ.

The Cutlers of *Damascus* write in iron
 steel, and brass, with corroding waters
 only, wherewith they make frets of cu-
 rious figures and characters in sundry
 colours; as may be seen on Turkish Sci-
 miters, and those *Gladii Damascinati*,
 Swords made at that City of *Damascus*,
 beautified with Damask work and Em-
 broidery.

broidery. It lasts long, for with one pen did Dr *Holland* a Physitian of *Coventry*, a learned and industrious man, write out that great Volume of *Pliny*, translated into English by himself, which (for a memorial) a Lady preserved, and bestowed a silver case upon it. The Queen of *Hungary* in the year 1540 had a silver pen bestowed upon her, which had this Inscription on it,

Publii Ovidii Calamus.

Found under the ruines of some Monument in that Country, as Mr *Sands* in the life of *Ovid* (prefixt to his *Metamorphosis*) relates.

CAP.

C A P. V.

ΤΥΠΟΓΡΑΦΙΚΗ:

O F

*Printing, and Printing-
Presses.**De invent.
typogr.*

THis is a divine benefit afforded to mankind, saith *Polydor Virgil*; an Art that is second or inferiour to none, (saith *Cardan*) either for wit or usefulness: it puts down hand-writing for neatness and expedition; for by this, more work is dispatched in one day, then many *Librarians* or book-writers could do in a year.

*Readi in-
venza ade-
spora.*

— *Quam nulla satis mirabitur ætas
Ars Cælo delapsa viris; consumere nata
Materiem, veloxque omnes transcribere
libros,
Cum positis, quadrata acie (miro ordine)
signis.*

This

This Art by multiplying books, hath multiplied knowledge, and hath brought to our cognizance both persons and actions remote from us, and long before our time, which otherwise had perished in oblivion, and never come to our ears.

To whom we owe this Invention, we do not certainly know, it is one of the *Inventa Adespota*, of the masterless Inventions.

Laus veterum est meruisse omnis praeconia fama,

Et sprevisse simul—————

Ancient Worthies were more studious of doing good then ambitious of Fame or praise for so doing. That it is a Dutch invention is agreed upon by most voices.

O Germanica muneris reperitrix

Quo nihil utilius dedit vetustas,

Libros scribere qua doces premendo.

But whether *higher* or *lower* Germany shall have the honour of it, is yet in strife and undecided; and in the upper Germany, whether *Mentz*, or *Basil*, or *Straßburg*; for all these do chalenge it, and do no less contend for the birth place of this mystery, then the Grecians Cities did for the Cradle of *Homer*. The general voice is for *Mentz*, and one *John Guttemberg*
or

Fust (as others term him) a Knight and Citizen of that City to have been the true Father or Inventor of this Art, about the year 1440. as we have heard it boldly affirmed by the Citizens of that City, saith *Polydor, l. 2. de Invent. rerum. c. 7.* for a testimony hercof they produce a copie of *Tully's Offices* printed in parchment, and preserved in the Library of *Ausburg*, bearing this memorandum at the latter end of it, *Præsens M. Tullii opus clarissimum Jo. Fust Moguntinus Civis, non Atramento plumali Cannâ, neq; areâ, sed arte quâdam per pulchrâ manu Petri Gerskeim pueri mei fœliciter effeci, finitum Anno 1440. die 4^o mense Feb.* This is cited by *Salmuth* in his Annotations on *Pancirollus*, who stands stiffly for *Germany* (his own Country) in this point, and cites another argument from the Library of *Francfort*, wherein an old copie of the decisions of the *Rota* are kept; at the latter end thereof it is said, that it was printed in *Civitate Moguntia, artis impressoria inventrice & elimatrice primâ.*

But *Hadrianus Junius* a very learned man of the Low Countries, is as stiff on the other side for *Haerlem*, and thinks to carry it clearly from the High Dutch, and

and make the Town of *Haerlem* the birth place of this Noble Art : You may see what esteem men do make of it, when they do so zealously strive and contend for the original Invention of it. *Junius* tells us (in his History of the Netherlands) that one *Laurence John*, a Burger of good Note and Quality of *Haerlem*, was the first Inventer of it, and saith that he made Letters first of the barks of Trees, which being set and ranked in order, and clapt with their heels upward upon paper, he made the first essay and experiment of this Art : At first he made but a line or two, then whole pages, and then books, but printed on one side only. Which rudiments of the Art *Junius* saw in that Town.

After this the said *Lawrence* made Types or characters of Tin, and brought the Art to further perfection daylie : but one *John Faustus* (*infaustus* to him) whom he had employed for a Compositor, and who had now learn'd the mystery, stole away by night all the Letters and other Utensils belonging to the Trade, and went away with them to *Amsterdam* first, thence to *Collen*, and lastly to *Menix*, where he set up for him-

self, and the first fruit and specimen of his Press there, was the *Doctrinal* of one *Alexander Gallus*, which he printed *Anno Dom. 1440*. Thus far *Juntus* from the relations of sundry grave ancient Burgo-masters of *Haerlem*. *Hegenitz* a Travel-ler saith, that the house of *Lawrence Fohn* is yet standing in the Market place of *Haerlem*, with this Inscription in golden Letters over the door,

Memoriæ sacrum.

*Typographia Ars Artium Conservatrix,
hic primum inventa, circa An. 1440.*

*Vana quid Architypos & Præla (Mogun-
tia) jactas?*

*Harlemi Archetypus prælaq; nota scias.
Extulit hic monstrante Deo Laurentius
Artem*

*Disimulare virum hunc, disimulare
Deum est.*

So *Petrus Scriverius*, who calls it *pal-ladium præsidium & tutelam Musarum, & omnis Doctrina*. *Joseph Scaliger* contends that the first Printing was upon wooden Tables, the Letters being cut or carved in

in them, and he saith, that he had seen *Horologium Beata Maria* (to wit) our Ladies hours done upon Parchment after such a manner, in his answer against *Shcioppus*, called *Confutatio Fabula Burdumane*. Yet let not the Germans or any others be too proud of this Invention, for the *Chinois* had such an art long before the *Europeans* saw or heard any thing of it, as it is affirmed by *Parus Maffeus*, and sundry others of his fellow-Jesuites that have travelled that Country. One *Nicol. Trigault* that had been of late years in that Country affirms, that that Nation had this art above 500 years since. But their Printing and ours do very much differ from one another, for they do not print by composing of Letters, but as we use for Maps and such pieces, they make for every leaf a board or table with characters on both sides, which is more laborious, and less neat then the European way, as *Gonsalva Mendoza* a Spanish Frier and others do affirm of it. Now if our Printing surpasses for neatness and expedition, and is so far different from that of the *Chinois* as is before alledged, it is a signe that the Germans did not borrow from them this art; so that the praise and.

commendation of this Invention remains to them whole and entire without diminution.

Mrs *Jean Elizabeth Weston*, one of the Muses of *England*, hath composed a Latine Poem (among sundry others of her compositions) in the praise of this art, which is indeed the preserver of all other arts.

AS Printing it self is praise worthy, so some Print-houses deserve here to be remembred, especially that of *Christopher Plantin* at *Antwerp*, which a Traveller doth not stick to call *Oſtavum orbis miraculum*, the eighth wonder of the world. He describes it thus. Over the Gate is *Plantine's* own Statue, made of Freeze-stone, and of *Moret* his Son in Law, and Successor in the Office, and also of *Fustus Lipsius* with his Motto,
 ——— *Moribus Antiquis*.

Here are twelve Presses, and near upon an hundred sorts of Characters : two sorts of Syriac, ten of Hebrew, nine of Greek, forty seven of Latine, and the rest of several other Languages, with Musical characters of sundry sorts, and admirable

admirable brass cuts for Frontispieces of books. Here that excellent work called the King of *Spain's* Bible was done.

The first Printing Press in *England* was set up in *Westminster* Abby by *Simon Islip* Anno 1471, and *William Caxton* was the first that practised it there, as *Stowe* in his *Survey of London* affirms.

CAP.

CAP. VI.

ΓΡΑΦΙΚΗ :

OR,

*The Art of Limning and
Painting.*

Of Archi-
tecture.
Elinguis
umbrarum
& lumi-
num elo-
quentia ;
muta line-
arum po-
esis.

PAinting comes near an *Artificial Mi-
racle*, saith Sir Henry Wotton, to
make divers distinct eminences appear
upon a Flat by force of shaddows, and
yet the shaddows themselves not to ap-
pear, is the uttermost value and ver-
ue of a Painter, saith that Learned
Knight.

———*mirror*

*Prælia rubricâ picta aut Carbone
velut si*

*Re verâ pugnent, feriant, vitentq;
moventes*

Arma viri———

This is a lawfull *dissembling* or coun-
terfeiting of natural things; it is a witty
and

and subtile Art, it gives life (in a manner) to the dead; by this wee see those that have lived many ages before us in their true and proper colours, and reade not onely the shape and stature of their Bodies but their Attire, Habiliments and Fashions, which no relation of History can so well represent unto us or inform us of. By this wee see our absent Friends, and call to minde what is farr out of sight. By this *Apelles* shewed to King *Ptolomy* the servant that brought him to the Kings Dining-Chamber, by drawing his picture on a wall wth a coal, when hee could not finde his person. By this, antient Histories are acted (in a dumb shew before us, and every real becomes a book; wherein the most ignorant man can reade something, and understand by the pencil what he cannot by the pen. S^t Gregory spoke right enough in this : *quod legentibus Scriptura, hac Idiotis pictura præstat cernentibus; quia in ipsa etiam ignorantes vident, quod sequi debeant, in ipsa legunt qui litteras nesciunt.*

And becaule the eye is a better informer than the ear, and conveighs things more effectually to the minde, and imprints them deeper; therefore some vi-

Hentzneri
Itinera-
rium.

fible Representations are as usefull for our instruction as those things that wee take in at the ear. Upon this consideration, that excellent *Emblem* of Mortality called *Chorea Mortuorum*, or *Deaths-dance*, that was pourtrayed on the wall of a Church in the Town of *Basil* in *Germany* being decayed with time, was thought fit (by the *Edils* or publique Surveyors of that City) to be renewed; *ut qui vocalis pictura divina monita securi audiunt, muta saltem Poeseos miserabili spectaculo, ad seriam Philosophiam excitentur*, as the new Inscription there speaks.

This Art had but rude beginnings, as all others had; the *shaddows* of men projected upon the ground or the wall, gave it birth; whence pictures are termed *shaddows*, which very name betrays their original. A Coal was at first both the pencil and the colour, and a white wall was their table and canvas.

Pictorum Calami carbones, mania Charta.

From one colour they rose to ten; they have *decem palmarios colores*, as *Bullinger* saith; ten colours of principal note,

note, besides others. Painters (of old) were desired to set a name on every thing they drew, that men might know what they meant.

Thus it was, when this Art was yet *ἐν τοῖς ἀρχαίοις* (as *Ælian* speaks) in its swathes and cradle. At first they portrayed but the bare Lineaments and natural Representations of things in one solemn posture and scheme called *μορο-ῥεῖα*, and *Aristides* the Theban was the first, *qui animum pinxit & sensus*, saith *Pliny*; that added the *Ethick* part of Painting, and expressed the passions with his pencil; that made his *mute* tables to laugh or weep, smile or frown, as the drift of his *fancie* suggested unto him.

Apelles brought this Art to perfection, as the same *Pliny* affirms; for hee surpassed *omnes prius genitos, futurosque postea*, as hee saith; all that went before him or ever should come after him. He painted things that could not be painted, as *Lightening* and *Thunders*, as *Pliny* relates of him, *l. 3. c. 10.* Paint mee a voice (saith the Angel in *Esdras*, and call back yesterday; intimating both to be impossible. His Master-piece was the picture

*l. 35. Hist.
Nat. c. 10.*

picture of *Venus* rising out of the Sea, and wringing the water out of her distrevelled hair. This was called 'Απειρίτη ἀραδυσμένη, whereof *Ovid* makes mention, l. 4. de *Ponto*.

*Ut Venus artificis labor est &
Gloria Coi,*

*Aequoreo madidas qua premis
imbre comas.*

When this *Apelles* came to *Rhodes*, where *Protogenes* (another famous Painter) lived, he went to his house, and not finding him within, he drew with a pencil a streight line, very small and slender, and left it as a challenge, and went his way: *Protogenes* coming home and finding this line, did guess that *Apelles* had been there, and thereupon drew another line through the very midst of that line of *Apelles* with a different colour, which was (in effect) an answer to the challenge; *Apelles* returning again to *Protogenes* his shop, and finding a line most artificially drawn through the midst of his, took the pencil and drew a third line in a different colour, from the two former, *nullum relinquens amplius subtilitati locum* (saith my Author) leaving

no room for further art or subtilty, and so was *Pictor* in this invention.

However, *Protopogenes* was esteemed nothing inferior to *Apelles*, whom *Petronius* mentions; *Protopogenis Rudimenta cum ipsius natura veritate certantia, non sine quodam horrore tractavi*, saith *Petronius Arbitr.*

There is a pretty story in the same *Pliny* to this purpose, touching *Zenxes* and *Parrhasius*, two famous Artizans and Masters of the Pencil in their times: for *Quintilian* calls this *Parrhasius* the *Legislator* among the Painters, that is, one that gave Law to all others in this Art, l.c. 12. c. 10. *Zenxes* for his Master-piece hung forth a Table wherein he had drawn a Boy carrying Grapes in his hand, which were so lively done, that the Birds flew to the Table to peck at the Grapes: But *Parrhasius* painted a Curtain upon a Tablet so artificially, that *Zenxes* thinking it had been a Curtain indeed, stretcht his hand to draw the Curtain aside, that he might see the picture which he thought to be behinde it; at which error he was so abashed, that he yielded the best to *Parrhasius*, adding this ingenuous confession, That *Zenxes* his

his piece had deceived but silly Birds, but that of *Parrhasius* deceived an *Artist*.

The same *Zenxes* painted an Old Woman so lively and so deformed, that he died with extream laughter, at the spectacle and his own ridiculous fancy and conceit therein, as *Quercetan* reports in his *Dietat. Polyhist.*

Pliny makes mention of some Women painters; and of one *Lala* a Virgin of *Cyzicum*, that drew her own picture by a Glass: and *Montaigne* in his *Essaies* speaks of a picture which he had seen at *Barleduc* that *Ren* King of *Sicily* had made of himself and presented to the French King *Francis* the Second.

It is a pretty Art, that in a pleated paper, and table furrowed or indented, men make one picture to represent several faces; as one I have seen, that looking from one place or standing, represented *Edward* the Sixth; from another, Queen *Elizabeth*; and from a third place, King *James*. Another I read of, that being viewed from one place, did shew the head of a Spaniard, and from another the head of an Ass. This was the conceit of a Frenchmen (I believe)

believe) who can neither speak well nor think well of a Spaniard.

One of the late *Chancellours* of *France* had in his cabinet a picture w^{ch} presented to the common beholder a multitude of little faces, which were the famous *Ancestors* of that noble man; but if one did look on the said picture through a *Perspective*, there appeared onely the single pourtraiture of the *Chancellour* himself: the *Painter* thereby intimating, that in him alone were contracted all the vertues of his *Progenitors*. So the ingenious translator of *Pastor Fido* in his *Epistle Dedicatory* relates.

Mr Fan-
shaw.

Painting in *Oyle* is a modern Invention, which was wanting to the full complement and perfection of this Art; for hereby Colours are kept fresh and lively from fading, and pictures are made to bear against the injuries of time, air, and age; when their *Prototypes* and originals cannot, notwithstanding all the *Fucuses* and *decorations* and *Adulteries* of Art among our *Women-painters*, who can never repair the decayes of nature with all their boxes and shops of *Minerals*.

The

The Art of Sculpture or Engraving in brasse (which the French call *de taille Douce*) is near of kin to this art, and herein to be preferred before it; for that when a picture in this kinde is finished upon a table of Brasse or Copper, or the like mettall, a thousand Copies may be taken of it (by the help of a Rolling-Press) in a few hours space, as in Printing, when one page of a leaf is set and composed, that one form will serve to make a thousand more by it, and that in a trice, whereas a picture in colours is not so soon copied out.

But the highest piece of perfection in this art (in my judgement) are those perspective pieces which do represent Temples, wherein the vulgar eye discerns nothing upon the Tablet but arched lines and steps, degrees, or ascents; but with a Perspective glass you may see (as it were) the inside of a Temple at full length with the arched roofs above, & windows on each side: Some Statues cast in brasse do shew much wit and art. The brazen Cow of *Myron* is made famous by the Epigram of *Ausonius* translated out of Greek, which was so lively done, that Bulls passing by thought to cover her, as the

the Poet (if he do not over-reach) informs
us.

*Bacula sum, cælo genitoris facta Myro-
nis*

*Ærea, nec factam me puto sed geni- Ausonius
tam Epig. 57.*

*Sic me Taurus init, sic proxima bucula
Mugit*

*Sic vitulus sitiens ubera nostra petit:
Miraris quod fallo gregem? Gregis ipse
Magister*

Inter pascentes me numerare solet.

But the chiefest of this art of Foun- *Plin. l. 35
cap. 8.*
dery or Imagery was *Lysippus*, who did
cast one Image of brass so rare and ex-
quisite, that Artificers called it the *Canon*,
that is, the rule or standard from whence
all Artists must fetch their Draughts,
Symmetries, and Proportions, as from
the pattern and most absolute Master-
piece.

Of late times the Italians and Germans
do surpass in these Arts, *Michael Angelo
Buonarota* of *Florence*, was both an Ar-
chitect, a Painter, and a Sculptor.

— *Veras depingere formas,
Naturam ipse doces, victam subigisque
fateri:*

Dextra

*Dextra sed ingenio non infælicior, & te
Nobilitant Calami, sicut cælo atq; colores*
So one of his countrymen writes of him.

Albertus Durerus of *Norimberg* was not
inferiour to *Apelles*, as *Wimphelingius*
tells us; *Van Dijk* a Dutchman was very
famous in *London*, and attained to very
great wealth by his art; *Paulus Rubens*
of *Antwerp* is *vivum Europæ miraculum*,
(if he be yet alive) as an ingenious Tra-
veller styles him, whose Table of the
Last Judgement was valued at five thou-
sand Florins; *Tabula oppidorum opibus
emptæ*; so *Pliny* of the *Curiosities* of his
time.

The Art of Painting in Glass, which
they call *Annealing*, is very ingenious:
when they have layed the colours upon
the Glass, they put the Glass into some
hot Furnace for fifteen or twenty days to
imbibe the colours: This art was known
unto the Ancients, as *Bullinger* is per-
swaded, and cites a Distich of *Martial*
for it;

*Non sumus audacis plebeia Toreumata
vitri*

*Nostra nec ardenti gemma feritur
aqua.*

But

But the Poet means no such matter there, but he speaks of certain cups made of Chrystal, or some subtiler and finer sort of Glass which cannot brook hot water, as common glasses can, but crack presently when it is poured into them, as appears by his words in another Epigram which give light to this;

*Nullum sollicitant hoc Flacce torremata
furem*

*Et nimium calidis non vitiantur
aquis. l. 12. Epig. 57.*

The Ægyptians had a device of making pictures in their fine linnen cloth, which was thus; when they had drawn the colours upon the cloth, and those pictures & fancies they thought fit, nothing would be seen upon the cloth until they had cast it into a cauldron of boyling water, wherein certain herbs and juyces had been boiled, and having sokened them there, in a little while they drew them forth with perfect and lively pictures; so *Bulenger de Pictura & Statuaria, lib. 1. c. 12.* out of *Pliny*.

To work pictures not only upon cloth but in cloth, to inlay and incorporate
H them

them (as it were) into the very substance and contexture of the Webb, and that so lively, as the Pencil can scarce mend them, as we have seen in Carpets and Chamber-hangings, which is an art no less subtile and ingenious then any of the rest. These are called *Pictura textiles* by *Tully l. 4. contra Verrem*, & by *Lucret. l. 2*. By this Art we have Fountains, Gardens, and Forrests in our chambers, Roses that never fade, Flowers that look fresh all the year, also Groves and Forrests that are alwaies green, with all manner of Beasts and Birds therein, with chales and Hounds so lively represented, that there wants nothing but noise and sound to make up the Game, as *Martiall* said of the carved Fishes made by *Phidias* so lively, that there wanted nothing but water to make them swim.

Artis Phidiacæ toreumaclarum

Pisces Aspicis? adde aquas, natabunt;

Phidias did these Fishes Limn,

Add but water, they will swim.

The Babylonians were the first that taught this art, as *Polydor Virgil* acquaints us: But the Artificers of *Arras* in *Flanders* whence our rich *Arras* is fetcht, & called *Arras-work*, are not thought inferior

to any Nation in this Workmanship. I will conclude this chapter with Mosaick work, which the French call *Marbuetrie*, the Latines *Museum*, and *Musivum opus*, the Greeks *λιθόεργον*, it's a work wrought with stones of divers colours, mettals, marble, glass, and all wrought into the form of knots, flowers, and other devices, with that excellency of cunning, that they seem all one stone, and rather the work of nature then art. The Ancients were not ignorant of this Art, see *Pliny lib. 36. Nat. Hist. cap. 25.* and more copiously in *Balenger, de Piet. l. 1. c. 8.*

The picture of *Laoco* and his two sons with the serpents clasping about their middle, according to *Virgil's* description in the 2^d of the *Aeneis*, is now in the Popes Palace at *Rome*, and is esteemed the most absolute piece of Art in the whole world, and which *Mich. Angelo* (one that could well judge of such things) did not stick to call *artis miraculum*, the miracle of art, as *Laurent. Schraderus* in l. 2. of the *monuments of Italy*. It is a piece of antiquity, mentioned by *Pliny*, laboured by three *Rhodian* Sculptors, that were the excellentest in their times, as the said *Pliny* hath recorded,

CAP. VII.

ΥΦΑΝΤΙΚΗ:

OR,

The Art of Spinning and Weaving; with the several Materials of Garments among sundry nations.

l. de Pall.

WEE come now *ad Vestificina ingenia* (as *Tertullian* speaks) to the Art of *Spinning* and *Weaving*; which, though they be vulgar Occupations, yet are no vulgar *Mysteries* and inventions, as appears by the various instruments that are used for both. The former invention, to wit *Spinning*, is ascribed to less Deity than *Minerva* the Goddess of Wisdom: *Ovid* calls it

πολυδαί-
δαλον ἴσον
ὑφαίνειν.
Hes.

— *Divina Palladis artem.*

Hec

Hee that confiders the Wheel, the Wherve, the Spindle, with other Tacklings and *Accoutrements* that belong to Spinning, with the fabrick of the Loom and Shuttle, and other instruments of Weaving, will confess that it was no vulgar wit that devised and framed them.

In *Dantzick* in *Poland* there was set up a rare invention for weaving of 4 or five Webs at a time without any humane help; it was an *Automaton* or Engine that moved of it self and would work night and day: which invention was suppress'd, because it would prejudice the poor people of the Town; and the Artificer was made away secretly (as 'tis conceived) as *Lancellotti* the Italian Abbot relates out of the mouth of one Mr *Muller* a *Polonian* that had seen the device.

The first Garments that wee read of, were made of Figg-leaves sowed together, as our first-parents did, *Gen.* 3. 7. *Paul* the *Hermite* (desirous to take the thriftiest way and simplest to live) made him a suit of the leaves of *Palm-trees*.

Nexilis antefuit vestis, quam textilis unquam.

Suits of the primitive fashion were made of the skins of Beasts, which men killed for food : *cum antea induvia hominum, erant brutorum exuvia*, Hecurn, l. i. Spinning is a subordinate Art to Weaving, and therein *Arachne* was excellent in her time, and presumed so much on her skill that shee challenged *Pallas* her self to a tryal of skill in this Mystery.

— *Tantus decor affuit arti,
Sive rudem primos lanamglomera-
bat in orbes,
Seu digitis subigebat opus repetitaq;
longo
Vellera mollibat, nebulas aequantia
tractu.*

Whether shee orb-like rowl'd the
ruder wool,
Or finely fingered the selected Cull,
Or draw it into cloud-resembling
flakes,
Or equal twine with swift-turn'd
Spindle makes.

As thread is spun and made of wool, silk, hair, hemp, flax and the like : so cloth is weaved and webs are made of these several sorts. The nettle affords a kinde of thread like hemp, whereof Nettle-cloth is made. I have seen cloth made of the innermost bark of a tree ; Mr *Purchas* makes often mention of the like ; *Strabo* of the *Massages* hath the same : *Massageta vestiuntur libris arborum, quod lanâ careant*, *Strabo l.ii. Geogr.* And *Purchas* saith farther, That of certain *Palm-trees*, *Velvets*, *Sattens*, *Damasks*, and *Tassita's* are made, in the 6th book of his *Pilgrimage* and description of *Africa* : which Art the *Europeans* are ignorant of, I suppose. The *Mexicans* make cloth of the bark of the *Magnei* that famous Tree, which bears the *Coco* which wee call *Coker-nut*, and which is a *Cornu-copia* of it self, as *du-Bartas* describes it.

——which serves in *Mexico*

For weapon, wood, needle, and
thread, to sow,

Brick, honey, sugar, sucker,
balm and wine ;

H 4

Parch-

Parchment, perfume, apparel,
cord and line.

Monfieur *Peyrefc*, that great ftorer and
preserver of the rarities of Art and
Nature, had a kinde of a Pumpion
brought from *Mecha*, that was thready
within like filk; and hee had alfo a little
web of cloth that had been made of that
thread, which was very good filk, as Dr
Gaffendi relates in the life of the faid
Peyrefc. Befides this, there is no *Sericum*
vegetabile, no vegetable filk, as fome
have fupposed; there is no fuch deli-
cate wool as to make filk of, growing
upon the leaves or barks of trees, as
Virgil fings of the *Athiopian* and *Ca-*
thaiian Forrefts.

Georg. l. 2.

Qui nemora Ethiopum molli ca-
nentia lana,
Velleraq; è foliis depectunt tenuia
seres ?

Whofe mistake *Pliny* hath followed,
fpeaking of the *Seres lanificio sylvarum*
nobiles, &c. in the 6th book of his *nat.*
hif. c. 17. & *Indos sua arbores vestiunt*:
which Authors *Lipsius* follows in his
Commen-

Commentaries on *Tacitus*. But, the truth is, that silk is made and spun out of the bowels of a little Grub or worm, which is called the Silk-worm, which feeds upon lettices and the leaves of Mulberries, and no otherwise, as *Julius Scaliger* learnedly shews in his Exercitations against *Cardan*. *Exer.* 159. c. 9. and the *Seres* or people of *Cathaya* were the first that made use of this Spinners thread, and keemed it and weaved it into a web, from whence it hath the name of *Sericum*: from them it came first into Europe, *tam multiplici opere, tam longinquo orbe petitur, ut in publico Matrona transluceat*, saith the excellent *Pliny*, who inserts many a moral lesson among his natural observations: so far these thin aery stuffs, this *ventus Textilis* (as *Petronicus* calls it, and *ἀέριον ὑπόμαζα* as *Gr. Nazianzen*) is fetched, that it may be fit for Ladies; who delight in such diaphanous weares and foreign wares: it was of high esteem in all ages.

This precious fleece was onely
used to adorn

The sacred loynes of Princes
heretoforn,

saith

saith the divine *Bartol*. And in another place;

—fleeces fit for Princes robes

In *Serean* forrests hang in filken Globes.

But not growing naturally upon the trees, but spun by the worm that feeds upon them in the forrest.

One *Pamphilia* of the Isle of *Cos* was the first that weaved filks: whence *Cos vestis* properly is used for silk; the first that wore a garment hereof in Europe, was the Emperour *Marcus Aurelius Antoninus*. The worm was first brought into Europe in the Emperour *Justinians* time, by certain Monks that had travelled *Cathai*: They brought the eggs only to *Constantinople*, and then hatched the worms by putting the eggs in warm dung.

The *Spiders* lawn or web which he hangs upon the hedges, and (sometimes) in our windows, though it affords matter of wonder to the considerate beholder, that shall observe the accurateness and evenness of the thread, and the *Geometry* and regularity of the work in all points, yet it is of no use, except the sight of it hath (perhaps) given a hint to the art
of

of Weaving. Only in the *Summer Islands* and in some other parts of the West-Indies there are Spiders that (in Summer) spin perfect raw silk, both in substance and colour; the thread so strong that birds are entangled therein. These spiders are bigger than ours, and of rich, orient colours, as *Oviedo* the Spaniard hath related, and Captain *Smith* our Countrey-man in his description of those *Islands*.

The Prophets of old wore garments made of Hair, whence *Elias* is called *vir pilosus*, the hairie man, 2 *Reg.* 1.8. *S^t John* the Baptist had a garment made of Camels hair, *Matth.* 3.4. Grograms are made of Goats hair, pulled from off their backs: which kinde of Goats, *Babequius* reports that he had seen in *Asia*, whose hair was very fine and glistering, not inferior to silk, and hanging to the very ground: they have four horns, saith *Seal*, *Ex.* 199. Camelots or Chamlets are made of Camels hair, which is so fine, especially those of *Persian* race, that they may compare with *Milesian* wool for fineness, as *Ælian* reports, and the great ones used to wear thereof in those Countries.

Flax

Flax and hemp were first drest in Ægypt; *Fine linnen, with broydered work, and sails, first came from Ægypt*, saith the Prophet *Ezek. c. 27. v. 7.* and the Ægyptians are decyphered by this periphrasis in *Isalah*, *They that work in fine flax, and weave Net-works*, *Isa. 19. 9.* The Ægyptian priests did alwaies weave linnen in the Temples, and therefore are termed *linigeri*; so did the Jewish Priests, their Ephods, Miters, and other Vestures were linnen; and so the Priests of most Nations,

Velati lino & verbena tempora vincti.

Virgil.

Of finest Flax their Vestures are,
And on their heads they vervain wear
The fine linnen so often mentioned by
Moses for the holy garments, is made of the Bombase or Cotton that grows in balls upon certain shrubs; which kind of shrub is termed *κειροξύλον*, by *Theophrast*, the Wool-bearing Tree, and *ξύλον* simply, the Tree; whence *Linum Xylinum* in *Tremellius* his Translation is still rendred in the English Bible *fine linnen*; so that the fine linnen vestments of the Priests were made of Bombase, as the learned *Salmasius* hath observed in his Exercita-
tions

tions upon *Solinus*: so that the wool-bearing Trees in *Aethiopia* which *Virgil* speaks of, and the *Eriophori arbores* in *Theophrastus*, are not such trees as have a certain wool or dowl upon the outside of them, as the mall-Cotton, but short trees that bear a ball upon the top, pregnant with wool, which the Syrians call *Cott*, the Grecians *Gossypium*, the Italians *Bombagio*, and We *Bombase*.

But I believe that some part of their vesture was also of Flax, *Mundissima lini seges indatui & amictui sanctissimis Aegyptiorum Sacerdotibus usurpatur*, saith *Apuleius* in *Apologia*.

Hadrianus Junius a most learned man in his description of the *Netherlands*, doth highly extol the fine linnen made by the soft hands of the *Belgick Nuns* in *Holland* and the Town of *Cambray*, called from thence *Hollands* and *Cambricks*; *quarum cum nive certat candor, cum sindone tenuitas, cum bysso pretium*; so he speaks of them, and calls them *Regum & Reginarum precipuas delicias*; the chiefest delight of Kings and Queens.

There is a certain Shell-fish in the Sea called *pinna*, that bears a mossie dowl or wool whereof cloth was spun and made,
as

as *Tertullian* speaks in his book *de pallio*,
Et Arbusta nos vestiunt, & de mari vellera.
 These are his words; not only Trees af-
 ford wool, but also the Sea to clothe us
 withal; this wool or moss is so soft and
 delicate, that it is nothing inferiour to silk
 saith *Lacerda*, and therefore he calls it
Byssum marinum, Sea silk, in his notes
 upon *Tertullian*, though the true *Byssus*
 be lost, and also the *Carbasus*, whence
Carbasina vestes, insomuch that great
 Clerks can scarce tell us what they were,
 but that fine Stuffs were anciently made
 of them. One *Ferdinand Imperator*, a
 Drugster of *Naples*, a great storer of exo-
 tique and domestique Rarities, had some
 of this Sea-silk both weaved and unwea-
 ved, and also the Shell-fish that did bear
 it. Men have found a way not only *ar-
 bores Nere*, sed & *lapides*, not only to spin
 threads from Trees, as *Tertullian* speaks
 of the *Seres*, but also from stones. There
 is a stone called *Lapis Caristius*, and *Lapis
 Cyprus*, from the Countries that this
 stone or mineral is found, to wit *Cyprus*
 as *Strabo*, and mount *Caristus* in *Attica*,
 as *Trallianus* and *Dioscorides* report; it is
 like Allom in colour, and being beaten
 with a Mallet, it shews like a small hair,
 therefore

therefore called *Trichitis*, or the hayrie stone by some Greek Authors, & *Alumen Plumaceum*, or downy Alom, by the Latinists it is also called for the resemblance of it, *villus Salamandra*, Salamanders wool: This hair or dowl is spun into thread, and weaved into cloth, and the cloth so made hath this strange property, that being cast into the fire it will not burn, but if it be foul or stained, comes forth more bright and clean out of the flames; it is therefore called also *Amiantus*. *Ferdinand Imperatus* (before mentioned) had a piece of this cloth much like white silk. Of this hairy stone some made wick for candles that would not consume or burn out: such a candle was made by *Callimachus*, and hung up in the Temple of *Minerva* at *Athens*, as *Salmasius* relates in his *Pliniana exercitationes*.

There was a vegetable of this kinde, a sort of Flax called by the Grecians *Asbestos* and *Asbestinos*, that had the like property with the mineral before mention'd, saith the same *Salmasius*, whereof *Pliny* makes mention in l. 9. of his History, c. 1. and calls it Indian flax, and *linum vitum*, quick inconsumprible flax. *Solinus* makes mention of some sayls made in *Crete* of this

Langii E-
pist. Medi-
cin.

this stuff, *qua inter ignes valebant* (as he saith) that would not take fire, if it hath this property indeed, it is pity to put it to such vulgar use as to serve for sayls, that would better serve at our tables; for if men had table-clothes and napkins of this stuff, they might preset them before Diapers and Damasks, for it would save some cost & no small trouble in washing and drying such household implements, it is but throwing them into the fire, and they are presently washed and dryed at once.

Pliny indeed esteemed it equivalent to pearl and precious stone, for it was hard to be found, and difficult to be weaved, for the shortness of it (as he says) the bodies of Kings were used to be wrapt in this kinde of cloth when they were to be burnt, that the ashes might be preserved unmixt, for to be laid up in urns or pitchers, as the manner then was.

Pliny saw some Napkins of this sort in his time, and the experiment of their purifying demonstrated. One *Podocattar* a Cyprian Knight, and who wrote *de rebus Cypriis* in the year 1566. had both flax and cloth of this sort with him at *Venice*, and one *Thomas Porcacchius* hath
seen

seen the same in that Knights house, and many others with him, as he relates in his work concerning the Rites of Funerals. *Ludovicus Vives* also saw a Towel of that kinde at *Louaine* in *Brabant*, as he relates in his Commentary upon *S^c Augustine de Civitate Dei*, l. 21. c. 6.

Baptista Porta saw the same at *Venice* with a woman of *Cyprus*, and calls it *Secretum optimum, perpulchrum, perutile*, a very useful and profitable secret, *Nat. Magia*, l. 4. c. 25.

As stones and trees have been spun and weaved into cloth, so some mettals may be wrought to that use; *Attalic* garments were weav'd all of gold & thread, which sort of Vesture the Italians call *Veste di Brocato dioro*: Such a garment *Mary* the wife of the Emperour *Honorius* was buried in; for her Marble Coffin being digged up at *Rome* in the year 1544. where the foundation of *S^c Peters Church* was laid, all her body was found consumed save the Teeth and a few bones, but her golden apparel was fresh; out of which (being melted) was extracted 36 pounds weight of pure gold, as *Aldou- rand* relates in the first book of his *Museum Metallicum*. The Sidonians made

the like kinde of garments, as appears by these verses in *Virg. Æn. xi.*

Tum geminas vestes ostroq; auroq; rigentes

*Extulit Æneas, quas illi leta laborum
Ipsa suis quondam manibus Sidonia
Dido*

Fecerat, & tenui telas discreverat auro.

S^t Hierom in one of his Epistles, and *Paulus Diaconus* do make mention of a sort of wool that was rained down in the year 1119. in the Reign of *Valentinian* and *Valens*, which fell most about *Airekatum*, or the Province of *Artois* in *Flanders*, which was spun into cloth, and did much enrich the Country thereabouts.

The heavens rained down meat once for the people of Israel, now it rains down clothing; as there was *cælum escatile*, as *Salvian* speaks of the admirable *Manna*, when men did eat Angels food, so here was *cælum textile*, as I may so term it; the sky affords both food and rayment! Some of this wool in memorial of the miracle, is preserved to this day in the chief Church of *Arras*; to wit, *S^t Maries Church* there.

l. i. de Provid.

De Plumificiis.

An Appendix of the Plumary Art.

IN *Florida*, and other places of the *West Indies*, the Inhabitants make garments of Feathers with marvellous Art and Curiosity; as also rare and exquisite pictures; for in those Countries there are Birds of rare plumage, of very gay and gaudy colours, that have a gloss like silk, and put down the pride of the Peacock; some are of orient green, and some of excellent carnation and scarlet, more especially in their *Phenicopters*, *Parrots*, and *Tomincios*.

Their manner is to strip the Feathers from the Quills with neat pincers, and then to joyn them together with paste, mingling variety of colours in such a rare medley, that they make a very glorious shew. *Ferdinando Cortes* the Spaniard found abundance of these curious works in the Palace of *Moteczuma*, the wealthy Emperor of the *Mexicans*, which were such and so excellent, that none could make in silk, wax, or of needle-

work any things comparable to them; so he speaks in his second narration; and in his third he adds this, that they were so artificial and neat, that they cannot be described in writing, or presented to the imagination, except a man sees them.

Cardinal *Paleotus* had the picture of *S^t Hierom* kneeling before a Crucifix made of this Workmanship, which was sent him from *Spain*; some Fryers that had resided in those Countries of *America*, had learn'd the Art (it seems) from the Natives.

These pictures are made so accurately, that it would pose a judicious eye to discern or distinguish them from those that are made with the pencil, or the art of the painter.

This art was not unknown to the Ancients in this Hemisphere of the world: *S^t Hierom* makes mention of *operis Plumarii*, this plumary workmanship, in his Commentary upon *Exod. l. 26. 1.* and on chap. 39. of *Exod. v. 29.*

Seneca makes mention of it in his *Ep.* 90. *Non avium pluma in usum vestis conservantur, &c.* So also *Julius Firmicus* l. 3. *Astronom. c. 13.* & *Prudent. in Hamartig.*

— *Hunc videas lascivas prapete
curſu*

*Venantem tunicas ; avium quoqꝫ verſi-
colorum*

Indumenta novis Texentem plumea telis.

If this art be loſt in the old world (as indeed we can no where finde it on this ſide the Globe) it is preſerved (it ſeems) in the new, and that in the higheſt perfection, inſomuch that it puts down not only the admired pieces of *Zenxes* and *Apelles* of old, but alſo thoſe of *Michael Angelo*, and *Raphael Urbin* of later times: and the plumes of thoſe birds ſeem to ſurpaſs all their colours, not only for luſter and beauty, but alſo for duration and laſting.

See more of this Art in the learned *Fuller* his *Miſcellanea ſacra*, l. 4. c. 20. in *Foſ. Acoſta* l. 4. *La Gerda* his *Adverſaria ſacra*. *Pancirol. de novo Orbe* tit. 1.

CAP.

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curfu*

*Venantem tunicas ; avium quoqꝫ versi-
colorum*

Indumenta novis Texentem plumea telis.

If this art be lost in the old world (as indeed we can no where finde it on this side the Globe) it is preserved (it seems) in the new, and that in the highest perfection, insomuch that it puts down not only the admired pieces of *Zenxes* and *Apelles* of old, but also those of *Michael Angelo*, and *Raphael Urbin* of later times: and the plumes of those birds seem to surpass all their colours, not only for luster and beauty, but also for duration and lasting.

See more of this Art in the learned *Fuller* his *Miscellanea sacra*, l. 4. c. 20. in *Fos. Acosta* l. 4. *La Gerda* his *Adversaria sacra*. *Pancirol. de novo Orbe* tit. 1.

CAP.

C A P. VIII.

M O Y Σ I K H :

O R,

*Of the Art of Musick, with
sundry Instruments there-
unto belonging.*

THere is Musick in heaven and Musick on the way thither, in the sphears, as the Pythagoreans affirm: and therefore the soul of man being descended from heaven, & passing through those harmonious sphears, doth naturally delight in Harmony: *Anima in corpus desert memoriam Musica, cujus in cælo conscia fuit, saith Macrob. l. 2. in somn. Scipionis.* Nay, God made the body of man (wherein this musical soul is to sojourn) a kinde of a *living Organ* or Musical instrument: *Life is an harmonious Lesson* (as one saith) *which the soul playes*

plays upon the Organs of the body. There is but one pipe to this Organ (to wit) the Weasand; the Lungs are the bellows to make winde, and to inspire this pipe; yet with this one pipe (being variously stoppt) we can expresse a thousand sorts of notes and tunes, and make most ravishing musick; for there is no Harmony that is so delightfull and pleasing to man as *vocal*, or the musick of man's voice.

In imitation of this musical pipe in the throat of man, men devised to make musick with a *Syringe* or Reed; which being bored with holes, and stoppt with the fingers, and inspired with mans breath, was made to yield various and delightfull sounds. This was *Pastoral Musick* or *Shepherds Delight*, and was the invention of *Pan* the God of Shepherds, and of the *Arcadian* plains, in those golden dayes.

Pan primus calamos cerâ conjun-
gere plures
Instituit.——Virg. *Ecl.* 2.

Whence the Poets have feigned *Pan* to *Ovid. l. 1.*
be in love wit a *Syrinx*, a Nymph of *Metam.*

that name, but (in the moral) in love
 with that Pastoral musick of the Reed
 then in use. *Lucretius* doth ascribe the
 first hint of this Pastoral musick to the
whistling of the winds among the reeds,
 in his 5th book.

*Et Zephyri cava per calamorum
 sibila primum
 Agrestes docuere cavae inflare
 cicutas,
 Inde minutatim dulces didicere
 querelas,
 Tibia quas fundit digitis pulsata
 Canentium.
 Avia per nemora ad sylvas saltusq;
 reperta,
 Per loca Pastorum deserta, atque
 otia Dia.*

By murmuring of winde-shaken
 reeds, rude Swaines
 Learnt first of all to blow on
 hollow Canes,
 Then pipes of pieces framed,
 whence Musick sprung
 Played on by quavering fingers
 as they sung,

Devis'd

Devis'd in shades and plains;
 where shepherds graze
 Their bleating Flocks with
 leasure-crowned layes.

In imitation of the Reed, some have made tunefull pipes of the shank-bone of a Crane, which is called *Tibia*; from whence the pipe is also called *Tibia*, or a Flute, and he that playes thereon *Tibicen*, a *Flutist*. This was called *Manulos* (as *Pliny* testifieth) that is, single or simple Musick, and therefore probably the first; for men naturally do light upon single or simple notions, before mixt or compound, and begin with plain things before they proceed to finer curiosities; as plain songs were before descants and *chromatic-moods*.

There were Musical Instruments in the world before *Pans* time. *Jubal* the son of *Lamech* was *pater omnium trantantium citharam & organon*, as the holy Spirit speaks, *Gen. 4. 21. pater*, that is, in Hebrew sense, the Author and Inventor of the Harp and Organ, but what kinde of Instruments these were, *Moses* doth not inform us.

The *Ægyptian Mercury* was the first
 Inven-

Inventor of the Lyre or Harp. *Horace* calls him *curva lyra parentem*. The Invention was casual, thus : Finding a Tortoise-shell near the Nile-side, to the which some nerves or strings did hang, reaching from the one end to the other ; these strings having been dryed by the sun and well stretched, and being accidentally touched with the fingers, gave a shrill sound or twang from the hollow of the shell ; which gave him (being sagacious) a hint of framing the Lyre, or (as others say) the Lute. As *du-Bartas* (for one) who speaking of this *Mercury* and the Tortoise-shell, sings thus, in his *Handicrafts*.

And by this mould frames the
melodious Lute,
That makes woods hearken and
the stones be mute ;
The hills to dance, the heavens
go retrograde,
Lions be tame, and tempests
quickly vade.

Indeed, the *Lute* doth much resemble
the Tortoise-shell, and from that resemblance

balance it it called *Testudo*. So in *Proper.*
lib. 2.

*Tale facis carmen docta testudine,
 quale
 Cynibius impostis temperat Art-
 culis.*

What some have invented, others have perfected: *Terpander* made a Lyre or Harp of seven strings which before had but three, answerable to these three principal notes of *Treble*, *Mean*, and *Base*.

Obloquitur numeris septem discrimina vocum.

Simonides added an eighth string, and *Timotheus* a ninth, and holy *David* makes mention of a *Decachord* or ten-stringed Instrument.

Many Instruments have been invented by *K. David* for to be used in Gods service. But all sorts of these *vasa Cantici*, (as *Amos* calls them, *Am. 6. 5.*) of these musical Utenfils, are divided into *ῥαψάνδα & ἰλαρίσσια*. I may express them in English either *Mouth-Instruments* or *hand-Instruments*, founded either with the breath of the mouth or the touch of the

the hand: Of the first sort, are all Flutes, Pipes, Trumpets, Cornets, Sacbuts, &c. Of the other sort, are the Lute, Harp, Organ, Psaltery, Virginal, &c. All Instruments of Musick were by the Latines called *Organa*, Organs. But that which is more especially called by that name, makes a grave solemn Musick like the sober *Doric*, and hath been very anciently used (with Psalmodies) in Divine Service; the Inventor whereof was King *David*, as some affirm. Since his time, men have proceeded to marvellous Curiosities both in Musick and Musical Instruments. Not many years since, there was a pair of Organs made in *Italy* that would sound either Drum or Trumpet, or a full quire of men, as the *Organist* pleased; so that men would think they heard boyes and men distinctly sing their parts in Consort, as *Leander Alberti* (an eye and ear-witness thereof) relates, in his description of *Italy*.

A *Neapolitan* Artizan made a pair of Organs all of Alabaster stone, pipes, keyes and jacks, with a loud lusty sound, which he afterward bestowed upon the Duke of *Mantua*, and which *Leander Alberti* saw in the said Dukes Court,

Court, as he relates in his description of *Thuscany*.

The same *Leander* saw a pair of Organs at *Venice* made all of Glass, that made a delectable sound. This is mentioned also by M^r *Morison* in his Travels. Pope *Sylvester* the Second made in his younger years a pair of Organs that should play without an Organist; he used onely warm water to give them motion and sound. Such *Hydraulics* are frequent in *Italy*, that are moved with cold water as well as hot.

*Genebr.
Chron. ad
Ann. 997.*

Gaudentius Merula in his 5th book *de mirabilibus mundi* makes mention of an Organ in the Church of S^t *Ambrose* in *Millain*, whereof the pipes were some of wood, some of brass, and some of white Lead; which being played upon did express the sound of Cornets, Flutes, Drums and Trumpets with admirable variety and concord.

Many persons can sing very well naturally, but this natural Musick may be improved by Art, when they are taught to sing by Rules and Notes, and to govern their voices by acquired habits; and so there is an Art of Musick, as there is artificial Logick besides the natural;

tural : but because these natural Singers
are but few and scarce,

*Apparent varæ nantes in gurgite
vasto ;*

therefore to supply this defect, some
have musical Instruments for harmless
pleasure and delight, to appease the cares
of life, and for many other laudable and
honest uses, which I shall more largely
handle in the ensuing Appendix of the
Power and efficacy of Musick.

The Power and Efficacy of Musick.

THe Poets may be thought too la-
vish, and to strein themselves be-
yond *Ela* in praising the efficacy and
force of Musick, when they extend it to
things even without life and sense : when
they sing of *Orpheus*, that trees and rocks
and things without sense were sensible of
his powerfull Layes ; that windes were
silent and waters stopt their courses to
listen to his ravishing Numbers. *Horace*

is much upon this string in several of his Odes; and *Clandian* sings the same note in the beginning of his second book *de Raptu Proserpine*.

Vix auditus erat, venti sternuntur. & unda,

Pigrior astrictis Torpuit Hebrus aquis.

*Ardua nudato descendit populus Æmo,
Et comitem Quercum Pinus amica trahit.*

Englished.

No sooner heard, but Winds and Waves were laid;
And headlong *Hebrus* (as if frozen) stayd:

The lofty Poplars left high *Æmus* bare,

The Pine came with the Oak to hear his ayr.

So he speaks of that rare Musician *Orpheus*. *Virgil* saith the like of *Silenus*, when he sung

Tum vero in numerum Faunosq; ferasq; videres

Ludere; Tum rigidas motare cacumena Quercus.

Mr *Randolph's* Muse is in the same key in cōmendation of Musick, who because he

he hath expressed the power of Musick
to the height of Fancy, I thought good
to insert his *Rapture* in this place.

Musick, thou *Queen of Souls* ! get up
and string

Thy powerful Lute, and some sad *Re-*
quiem sing ;

Till Rocks requite thy Eccho with a
groan,

And the dull Cliffs repeat the duller
tone.

Then on a sudden with a gentle hand,
Run gently o're the Chords, and so
command

The Pine to dance, the Oak his roots
forgo,

The Holme, and aged Elme to foot it
too,

Myrtles shall caper, lofty Cedars run
And call the Courtly Palm to make
up one ;

Then in the midd'ft of all this jolly
train,

Strike a sad Note, and fix them Trees
again.

That Musick hath any such power o-
ver things *inanimate* I shall suspend my
faith ;

faith; but that it hath a great impressi-
 upon all things endued with sence, I shall
 evince by good proofs.

This *Regina sensuum*, as *Cassiodor* calls
 it, Queen Regent of our senses, and so-
 veraign Mistris of our affections.

Of all the creatures that God made,
 there is none that makes Musick or Har-
 mony but Man and Birds; but as among
 men all do not sing tuneably to delight
 the ear if they would never so fain: So
 among Birds, all are not fit for the Quire
 or Cage; There are but few sorts among
 the infinite variety of them, that are Mu-
 sical. Nevertheless though all men can-
 not make Musick; yet all are delighted
 with it; so for birds and beasts, though
 all do not sing, yet are all affected with
 melody and singing.

But to come from the Thesis to the
 Hypothesis, I will descend to some par-
 ticular instances, to shew the regency and
 power of Musick over insensible crea-
 tures.

Over the } *Rational* } Creatures.
 } *Irrational* }

The Roman Orator in his Oration *pro*
Archia Poeta tells us, that *Bestia inanes*
 K cantu

cantu flectuntur, & consistunt, that savage and innane beasts are so taken with Musick, that they will turn back and stand still to listen thereto. Henry Stephens

Præfat. ad Herod.

that learned man of *Paris* testifieth, that he saw a Lyon in the City of *London*, *qui Musicen audiendi gratiâ epulas suas desereret*; that would forsake his meat to hear Musick. *Mulcentur Cervi fistulâ Pastorali & Cantu*, says *Pliny*, Deer are much taken with the Musick of the Pipe; Elephants with singing; and the sound of Tabrets, as *Strabo*; and among all beasts there is none but the *Asse* that is not delighted with harmony, as the *Pythagoreans* affirm, Birds also and Fowl are generally affected with sweet sounds and harmony;

Ælian. hist. Animal. l. 10.

Marial.

Non solum calamis, sed cantu fallitur ales.

And

Fistula dulce canit volucrem dum decipit Auceps,

says the grave *Cæsar*. I heard from Falconers that singing did much conduce to the cicurating of Hawks: Nay Musick commands in all the Elements, and rules not only in the Ayr, but also in the Water among the *Mutes*; as that famous story

story of *Arion* and the Dolphin does testify: That story is recorded by *Herodotus*, and *Aul. Gellius*, and many other grave Historians, and it was briefly thus, *Arion* being at Sea, and sailing towards his own Country of *Lesbos*, some of his companions that were with him on ship-board knowing that he had money about him, conspired to rob him, and then to throw him into the Sea; *Arion* being made acquainted with their purpose, and having his Harp with him, desired so much respite that he might give them a lesson for a farewell, and then let them do their pleasure; when he had ended his lesson, and (like the Swan) had sung his own Dirge and last Notes (as he thought) in this world, he was thrown over-board; but it hapned that some Dolphins having gathered together about the Ship to hear his ravishing notes, one of them (in requital of his Musick) took *Arion* on his back, and waisted him safe to his own shore, and there laid down his load. In memory whereof the picture of the Dolphin was set up near that shore with a Greek Distich, which *Volaterran* translated into Latine thus,

*Cernis Amatorem qui vexit Ariona
Delphin:*

A Siculo subitas pondera grata mari.

The story is touched by *Ovid* in his third book *de Arte Amandi*;

*Quamvis mutus erat, voci favisse puta-
tur*

Piscis, Arionis fabula nota lyra.

Nay, the irresistible power of Musick reacheth deeper then the Sea, even as far as hell, it sways among the infernal fiends upon presumption of his powerful strains; *Orpheus* went down among them to fetch his wife *Euridice* from thence, as *Virgil* sings of him.

*Ausus at est manes accersere Conjugii
Orpheus*

Æn. 6.

Threiscia fretus lyra, fidibusq; canoris.

On whom *Mr Brown*. speaking of the commendation of *Spencer*, hath this reflexion in his Pastorals,

*Spencers
Fairy Q.*

He sung th' Heroick Knights of *Faery*
land,

In lines so elegant, and of such com-
mand,

That had the *Thracian* play'd but half
so well,

He had not left *Enridice* in Hell.

In

In the second place, for *rational* creatures, there's nothing more evident and more commonly seen, than that all sorts of people (more or less) are affected with harmony. And with most men it hath such power over their spirits, that it can mould them into any temper; *Omnēs animi habitus cantibus gubernantur* (saith *Macrobius*) *ut & ad bellum progressus* Somn. Scipionis, l. 2. *& recepti canatur: cantu & excitantur* c. 3. *& sedante virtutem*. It commands all our passions as it lists, either of anger or mildeness, joy or sorrow, according to the several streins and tunes it makes, as if there were some *μιμήσις* (as *Aristotle* Polit. l. 7. *speaks*) some imitations or *eccheings*, some secret sympathy between the strings of the Heart and the Harp, or any other Instrument that gives melody.

To illustrate this, I will give certain historical instances or examples of each kinde.

1. Musick stirs up Anger and Courage, especially that which they call *Phrygian* Musick, which consists of violent and loud notes and *sprighfull* motions,

tions, and this is usefull for the warrs; and therefore Drums, Trumpets and Cornets have been (anciently) used among most nations to encourage the souldiers in the field. *Virgil* speaking of *Misenus* (*Aeneas* his Trumpeter) gives this character of him.

— *Quo non prastantior alter
Are ciere viros, Martemq; accendere
cantu.*

Tyrteus that brave Commander of *Lacedaemon* made use of the Trumpet against the *Meſſenſians*, with whose unwonted sound they were much terrified, as his own souldiers were much animated therewith, as they were also with his Songs and Poems, as *Horace* testifies in his *Art of Poetry*.

— *Post hos, insignis Homerus,
Tyrteusque mares animos ad
martia bella
Versibus exacuit.*—

Horace, who had been a souldier for some years himself, speaks of his *Barbiton* which he had used in the warr, and which

which now he meant to hang up for a monument after his return home:

*Defunctumq; bello Barbiton , hic
paries habebit.*

2. As it *stirs* up Anger, so it doth *al-*
lay and appease it, and conjures down
that spirit which it raiseth up; *Cantando*
malos affectus incantamus. *Timotheus*
the Musician could both enrage and be-
calm the Great *Alexander* at his pleasure,
onely by the different streins of his Mu-
sic. *Clinias* the Pythagorean when hee
began to be heated with anger, would
take his *Lute* to compose his affections;
and *Achilles* (the great Souldier) was
wont to do the like, as *Ælian* reports of
them both. *Var. l. 14. c. 23.* this is *Ca-*
duceus pacis.

The Harp is *Tela Musarum loquax*, as
Cassiodor wittily stiles it, a speaking kind
of Instrument, whereby a man speaks
his passions without a tongue, and by
those *verbosa stamina* doth tell his tale
more effectually then he can with the na-
tural Organs of his speech. Therefore
the *Getes* (knowing the power of Musick
to move clemency) did use to send harps

and Musicians with those Embassadors that went to treat for peace and amitie. *Ludovicus Pius* the Emperour did set *Theodulpus* at liberty when he heard him sing an *Anthem*, which he had composed in Prison.

3. Musick *exhilarateth* the spirits and expelleth the evil spirit of melancholy, as *David* (the sweet singer of *Israel*) drave (with his celestial streins) the evil spirit out of *Saul*, and put him out of possession, without any other *exorcism* then that of Musick: It seems the diavel does not love Musick; but I know nothing else but does. *Scimus Musicam Daemonibus invisam & intolerabilem esse*, saith *Luther* in *Epist. ad Senfelium Musicum*. This may be better called *Fuga Demonum* than the herb *Hyperion*. *Melancholy* is the Devils Bath, wherein he takes much delight. And therefore, since Musick is an enemy to Melancholy, we may conclude that it is an enemy to the Diavel: Musick hath too much of heaven to give him any delight; he loves jarrs and discord better than concord and harmony.

4. This does compose men to gravity, contemplation, and godly sorrow, especially the grave *Doric* Musick

sick of the Church. Saint *Augustine* did shed tears when hee heard the solemn Musick of the Church at *Millain*, as he confesseth in the 9th of his *Confessions*. Hereby our devotion is exalted, our souls lifted up to heaven with those ecchoing sounds, and our spirits better prepared and disposed for prophetick raptures and divine illuminations. When *Elisha* was desired to Prophecie by King *Jehoshaphat*, he called for a *Minstrel* to make musick, thereby to defecate and clear his spirits; and as the minstrel play'd, the hand of the Lord came upon him and he prophesied victory and good tidings to the King, 1 *King*. 3. 15. and that the Prophets did commonly use musical Instruments for that purpose, as we may learn from the first book of *Sam. cap. 14. v. 5.*

5. To these I may add in the 5th place, that Musick doth avail (not a little) to chastity, sobriety and civil conversation, as it may be used and applyed. When some young men of *Taurominum* were about to force open a house upon some women that they had a minde to, *Pythagoras* coming casually by, did appease their mindes and reduce them to a better mood,

mood, by making a Minstrel (that they had with them) to change his notes from nimble *Dactyls* or *triple* time into flow *Spondaics*, & so did becalm their hot and unruly spirits. *Spondeo resonante*, as *Cicero* relates in his *Tuscul.* and *Boetius* in *Proemio de Musica*, and *Quintilian* also in *Orator. instit. l. i. cap. 10.* A *Spondee* or *Spondaic* foot is a *grave* time consisting of two long syllables, so that if there be many of them in a verse, they make it to be of a slow heavy motion, like the *Spanish* gate and gravity ; as in that verse,

Conturbabantur Constantinopolitani.
Whereas the nimble *Dactyls* (whereof *Galliards* consist) are æry and sprightly like the *French* disposition, and like that verse in *Ennius* (which runs all upon *Dactyls*)

*Et tuba terribili sonitu Taratantara
dixit.*

The very sound and pronunciation whereof rouseth the spirits and mad-deth them in a sort ; as *Aristotle* speaks of the *Phrygian* mode in *Musick*, that it is ὀργαστικὴ, παθετικὴ καὶ ἐνθουσιαστικὴ, 4^o *Polit.* It is reported of *Agamemnon*, that when he went to the warrs, he left a *Mu-*
fician

lician with his wife *Clitemnestra* for to keep her chaste, by singing grave *Doric* tunes unto her. *Modus Dorius prudentia largitor est, & castitatis effector*, saith learned *Cassiodor lib.9. Var.c.3. ut Phrygius pugnas excitat, & Aolius animi tempestates tranquillat. Id.*

6. Lastly, by the power of Musick rude and savage people have been civilized, & brought to humanity and gentleness, brought from Woods and Gaves to live in Towns, taught to build houses, to live under Laws and in civil society and correspondency with their own kinde; so the *Thebans* were mollified by *Amphion*, and the rude *Thracians* by *Orpheus*: and this is the true meaning and moral of those Poetical Fables touching those two famed Musicians, as *Horace* tells us.

*Sylvestres homines sacer interpretisq;
Deorum*

*Cadibus & victu fædo deterruit
Orpheus.*

*Dictus ob hoc lentæ Tygres, rabidosq;
Leones;*

*Dictus & Amphion (Thebanæ Con-
ditor Arcis)*

Saxa

*Saxa movere sono Testudinis, &
prece blandâ
Ducere quo vellet.——*

Orpheus the Gods interpreter, from
bloud

Deterr'd wilde men and savage live-
lyhood.

Hence came the fable, that by
Musick hee

Did Tygers and wilde Lyons lenifie:
And hence *Amphion* (who built
Thebes) is said

To have mov'd stones with his sweet
streins, and led

Them where he would, &c.——

As Musick hath power over the spi-
rits of man, so it hath over his body too,
and that in two respects; partly, to keep
it from drooping and weariness, while it
is at work; and partly to cure it of some
maladies, as I shall produce examples of
both.

1. It avails to keep the body from
weariness and irksomness, and drooping
from under its dayly cares, toil & labor.
Horace calls his Lute *Dulce laborum le-
nimen*, the gentle easer of labour and
pains.

pains-taking. And *Quintilian* sayes,
That Nature seems to have given this
gift of Musick to mankinde for this ve-
ry purpose; and from hence it is that all
sorts of people use commonly to deceive
the tediousness of their dayly-task with
with some melodie. *Parrhasius* the Pain-
ter used to sing while he was at work.
*Cantu & modulatione submissâ, laborem
artis mitigare solebat*; so *Ælian* tells us,
lib. 9. cap. 11. The Husband-man sings
or whistles at his work.

*Altâ sub rupe canit frondator ad
auras.*

And his good wife at her wheel at home
makes some notes also that serve to
please her, if they please no body else.

*Interea longum cantu solata laborem
Arguto conjux percurrit pectine telas.*

And if men over-toyl themselves and
be tired out with labour, Musick is very
helpfull to recreate their spirits, and to
make them fresh and vigorous again:
*Musica est medicina molestia illius quæ
per labores suscipitur*, saith (the Patriarch
of

of *Philosophie*) *Aristotle*.] And *Tully* saith of the *Pythagoreans*, that after they had been weary with intensitive studies, their usual manner was to solace themselves in the evenings with Musick, as hard students in our Universities use to do now adayes.

2. As this heavenly gift expells weariness from our bodies, so it expells some maladies too. The Old Greek Bard (*Hommer*) saith, the Grecians did cure the plague with Musick, in the first book of his *Iliads*. The reason of this cure is, because Musick cheers up the spirits and expells sadness, than which nothing is more fatal in a time of Mortality, or makes the body more obnoxious to the tyranny of diseases.

Corporibus vires subtrahit ipse timor.
Fear and sadness betrayeth the succours that nature hath provided for her own defence, and doth expose our bodies naked to the malignity of the air and invasion of any malady: Hereof you may finde more in the writings of *Physitians*, and particularly *Langius* in the 3^d book of *Medicinal Epistles* tells us of *Xenocrates*, that he used to cure Phrenetick persons with songs and musick; and
of

of *Theophrastus*, who by his own experience found that the pains of the *Sciatika* is much asswaged by Musick. They say in *France*, that Musick doth not cure the *Tooth-ach*: but yet some aches are cured by it; for *Macrobius*, to the other vertues of Musick, adds this, *Corporis morbis medetur*. But there are two diseases that are proper (in a manner) to *Germany* and *Italy*, which are cured by no other means than Musick. In *Italy*, they that are bitten with that venomous Spider called the *Tarantula* become Phrenetick, and the only way to cure them is to play upon Instruments unto them; at the sound whereof they fall a dancing, and bestir themselves so long untill they are quite tired and have sweated out the venom that was shot in by that Insect. In *Germany* also that disease which they call *Chorus Sti Viti*, or *Sti Vitus* his dance, is cured with Musick. It is a kinde of a Phrensie too, and when the Patients hear any Minstrel play, *saltant ad lassitudinem simul & sanitatem*, as *Shenkius* saith; they dance presently, and never give over till they are both tired and cured.

And these are sufficient proofs to shew the

the power and efficacy of Musick both over man and beast, and in man both over his body and minde. The truth is, we may observe, that *soluta Oratio*, plain prose, without harmony or meter, hath a great sway over mens mindes, if it be gracefully and pathetically delivered. The Orators among the *Grecians* had the power of fire and water, to enflame and to extinguish, to make peace or warr; such was *Demosthenes* in *Athens*.

Fru. Sat.

—— *Quem mirabantur Athena
Torrentem & pleni moderantem fraena
Theatri.*

That ruled and managed the people with his eloquent and voluble tongue, as a rider doth his horse with the reins. Eloquence is *flexamina & consilia*, there is some sorcery and enchantment in a well-composed Oration. *Hierom. Savanorela*, that pious man and eloquent preacher of *Florence*, did manage that Common-wealth with his tongue. *M. Lancelotti. Antonius milites armatos facundiâ suâ exarmavit. Vell. Paterc. l. 2. cap. 20.* And when *Ferdinand* the Second besieged *Rome*, one *Ugolin* a Friar, by a Sermon he

he made at the *Vatican*, did move all his Audience to weep, and did so enflame their courage withall, that they took arms unanimously to beat off the enemy from the walls; and they sallied out with so good success, that they raised the seige. If a plain Speech delivered with gravity & gracefulness hath such force, how much more moving are words joynd with Harmony and Numbers?

All the powers and vertues of Musick which we have here at large exemplified, are briefly comprised by the Noble *Salust* in these following verses.

Sweet Musick makes the sternest
men at arms

Let fall at once their anger and their
arms.

It chears sad souls, and charms the
frantick fits

Of Lunaticks that are bereft their
wits.

It kills the flame and curbs the fond
desire

Of him that burns in Beauties bla-
zing fire.

It cureth Serpents banefull bite,
whose anguish

L

In

In deadly torments makes them
madly languish.

The Swan is rapt, the Hinde de-
ceiv'd withall,

And Birds beguil'd with a melo-
dious call.

The Harp leads the Dolphin, and
the busie swarm

Of buzzing Bees the tinckling brass
does charm.

O! what is it Musick cannot do,
Sith th'al inspiring spirits it conquers
too?

And makes the same down the Em-
pyreal Pole

Descend to earth into a Prophets
soul.

Baptista Porta doth ascribe the won-
derfull effects of Musick to the severall
sorts of trees that the instruments are
made of, whether the Vine or the Elder,
the Poplar, Laurel, or the like; which
(saith he) have a secret property to cure
diseases, more then the sounds that are
made by them: but he is mistaken here-
in; for we know what power inartificial
sounds and bare words (without Musick
added) have over mens mindes and spi-
rits

rits. *Scaliger* argues the case thus: The Vibration or trembling of the air (caused by vocal or instrumental Musick) doth move and affect the spirits in mans body, which are subtile vapours of the blood and the instruments of the soul in all her operations; which spirits affect the soul as well as body, so that apt concordant sounds, carried in the curled air to the inward spirits, cause there a vitillation or pleasure, and sometimes other affections or passions according to the stresses of the Musick, and according to the complexion of the hearer.

The Ancient Sages (as *Aristotle* reports) affirmed the Soul it self to be Harmony or harmoniously composed; so that there is a sort of affinity between it and Musick, and every man is naturally delighted therewith; so he in the 8th of his *Politicks*. *Macrobius* cometh very near to this of the Philosopher; *Fure capitur Musicâ omne quod vivit* (saith he) *ut cælestis Anima, quâ animatur universitas, originem sumpsit ex Musica.* That it is no wonder that every creature that hath a living soul is taken with Musick, since the soul of the *Universe* (where-

of every particular soul is a part or parcel) is made of Harmony.

Pericles liberis Athenarum cervicibus jugum imposuit Eloquentia; he held captive the free born *Athenians* by his Eloquentice: *Eamq; urbem egit & versavit arbitrio suo*; steered and winded that people which way he listed himself. *V. Max. l. 8. c. 9.*

Hegesias a Philosopher of the *Cyrenaic* sect did so pathetically set forth the evils and discommodities of this life, that divers of his Auditors did take a resolution to make themselves away; so that the Philosopher was commanded by King *Ptolomy* to spend his Eloquentice upon some other subject. *Cic. Tuscul. Quaest. lib. 1.*

CAP. IX.

ΥΑΔΟΥΡΓΙΚΗ:

*Touching the Invention of
Glass and Glass-works.*

Glass is made of bright shining sand,
 and the ashes of a weed called *Caçal* — *Calices*
 and *Zubit*, and the Ferne called by the *vili de*
 Arabians *Kali Alkali*, that is Glass-wort. *pulvere na-*
ti. Mart.

The invention was casual, and hinted
 thus, Certain glebes or large pieces of
 Nitre being brought out of a ship upon
 the shore, and taking fire by accident,
 melted the sand round about, so that it
 ran in a liquid transparent stream, as *Pli-*
ny relates l. 36. *Nat. Hist.* and *Josephus*
l. 1. de bello Judaico; and the Sidonians
 were the first that took the hint or docu-
 ment therefrom; *Sidon artifex vitri, Plin.*
l. 5. This noble liquor (as *Pliny* calls it)
 is so obsequious and pliant (while it is

hot) that it may be spun into thred, and wrought into any form that a man can fancy; nay Art doth here imitate the Creation; for as God made creatures by the breath of his mouth, so the Artift makes glass with a breath, and blows it into what shape and figure he pleaseth. *Vitrarius suo spiritu vitrum in habitus plurimos format, qui vix diligenti manu offingerentur*, as a contemplative Philosopher observed of old touching this business, *Sen. Epist. 90.*

When it is cooled, it will not yeild to the point of any Iron or Steel, but only the Diamond; and the restless Quick-silver, that which pierces through Iron, gold, and brass, will not pierce through this. Cups and Vessels made of glass are very neat, clean, and wholesome. For they do not impart any ill tast or tincture to any liquor that is contained in them.

And they were (no doubt) as precious at first in this Hemisphere of the world as now they are in some parts of the Indies; for in the Kingdom of *Tydor* and other places, they exchange gold for glasses, as *Pigafetta* and sundry others do relate; so much are they taken with the acry brightness and transparency of them.

them: Moreover glass doth not wear with the using: It admits no poyson, but betrays it by breaking; any excessive cold or heat breaks it, especially if it be fine, like that of *Venice*; so Chrystal is impatient of heats, as *Pliny* tells us, and *Mar-tial* the Epigrammist in an Epigram we quoted before,

*Non sumus audacis Plebeia * tereumata*
vitri

* *Toreu-mata.*]

Nostra nec ardenti flamma feritur aqua.

This word shews that glasses were

sometimes wrought upon the Turn, or the Turners wheel, as earthen vessels are; the word comes from *τερεω τέρεω*, to turn; And *Pliny* doth expressly teach, that glass was wrought either by blowing of it, or by being Turned, or by being engraven like silver, l. 36. *Nat. Hist.*

The best of this kinde are made at the *Murano*, a place within 2 miles of *Venice*, so that the Venice glasses do bear the bell from all others: Here to make their glasses so clear and transparent, and so like Chrystal, they dip it (while it is hot) in clean water, whereby it is clarified, and made like the water it self, wherein it is so tinged and seasoned. Though the glass we now use be brittle ware, and easily shattered in pieces, yet there was an Artist in *Rome* in the Emperour *Tiberius* his time, that had found a way to make glass malleable and yeilding, and such as

would bow rather then break; for the man bringing a glass-phial for a present to the Emperour to shew his art, he threw the Vessel against the stone pavement, with which blow it was not broken, but dented; then taking his hammer he beat in the dent again, to the no small wonder of the spectators, as *Dion* relates in the 56th of his History, and *Suetonius*, with others. The man was secretly made away, and so the Art was suppress'd, lest gold should be discountenanc'd and become vile, as the same *Suetonius* adds in the life of that Emperour.

Ocularia.

The use of glass is various and manifold, not only for making cups & vessels, but also for Looking-glasses, Telescopes, Microscopes, Thermometers, Sphears, Spectacles, or Lunulets, as the French, and *Bis-oculi*, as my Lord of St Albans calls them; by the help of glasses, weak eyes are strengthned, & old eyes become young and vigorous; small objects are magnified and represented much bigger, things invisible are made visible, & things that are behinde us, brought before us: Yea, what things are done in our neighbours houses, and in our enemies tents, are brought to our knowledge without any

any *Mephistophilus* or Magick Art. See *Baptista Porta* his third book of his Natural Magick.

Cornelius van Dreble, a Citizen of *Alcmar* in *Holland*, and a rare *Engineer*, who lived in King *James* his Court here in *England* (as we mentioned before) invented the *Vitra Microscopia*, the Microscopes or glasses whereby we plainly see and discover the subtilest objects and the smallest, as the distinct colours and members of Flies and Worms and Nits, and the spots and small grains in Gemms, as also in Urine or Blood, w^{ch} the eye could not otherwise discern. With these the *Anatomists* (in dissecting of bodies) discover the smallest veins and strings and fibres in the body of man or beast. There are Glasses called *Thermoscopi* and *Thermometers*, which being placed in a mans chamber, will discover the disposition and temper of the air, whether it be hot or cold, moist or dry, or inclining to either, invented by one *Sanctorius*, a Physician in *Padua*.

There are also Glasses called *Telescopes*, from their use in discovering things afarr off. invented first by *Jacobus Metius* of *Alcmar*, as *Des Cartes* tells me,

me, and perfected (since) by *Galileo Galilei* the Florentine, whereby they have discovered many new Stars in the firmament, which no mortal eyes had noted before, which will represent objects thirty times bigger than their apparent quantity, and a hundred times nearer than their apparent distance. By these men have discovered not only new stars, but also *new worlds* in the stars, brought the moon before them to be better surveyed and perused, which they finde to be another *America*, full of pleasant rivers, hills and dales, and also well inhabited with people (such as they are) viz. *Lunatick people*. One *Telesius* a *Dane* hath (of late) given us a *Selenographia* or description of the Countries and Provinces there, with their several maps. *Cornelius Drebbel* before-mentioned had a little glass (but of a hands breadth in Diameter) which he called *Fabius Opticus*, wherewith he could distinctly see all the hills and spacious plains in the *Lunary world*, as also all the forrests, cities and buildings there, as *Dr Gassendi* relates it in *l. 5.* written of the life of *Peyresc*.

There are Burning-glasses, wherewith (like *Prometheus*) we fetch fire from heaven;

ven; to wit, that celestial coal the Sun,
 by gathering his fiery beams into some
 narrow compass, and uniting them to
 that strength, that they can set any com-
 bustible stuff on fire: With such glass-
 ses *Archimedes* fired the Roman ships in
 the Harbour of *Syracuse*, *Marcellus* be-
 ing General, as *Plutarch* reports in the
 life of *Marcellus*. With the like glasses
Proclus (after him) defended *Constanti-*
nople, by firing the ships of *Vitalianus*,
 who was beleaguering the town by sea,
 as *Zonaras* hath recorded in the life of
Anastasius Dicorus. *Roger Bacon* our
 Countrey-man, a * great Scholar and
 an acute man, told the Pope, That if he
 would be at the charge of making certain
 Burning-glasses after his direction, he
 would annoy the Turks more than all
 the Gallies of *Italy*, or an Army of
 an hundred thousand men could do, as
Gaffarellus and others relate.

* Vir tam
 vasta de-
 strina, ut
 Anglia,
 imo orbis,
 ea re nihil
 haberet si-
 mile aut
 secundum
 Vols. de

Kircher, a great Scholar (now living
 in *Rome*) confesseth that he hath busted
 his head very much about those glasses
 of *Archimedes* and *Proclus*, and about
 making the like, but he could never hit
 upon the experiment; and he saith, that
 he never saw or heard of any glasses (of
 late)

artibus po-
 pulari Ari-
 magna, l. 10

late) that would burn above 15 paces distance. But *Baptista Porta* professes a way how to make glasses that would burn and fire things at any distance. And *John Dee*, an eminent Mathematician of this Nation, doth profess (in a preface to a book of his called *Monas Hieroglyphica*) the Art to make a Glass that should calcine stones and reduce them to impalpable dust: these are *magnalia Artis*. But these things have been yet but in speculation for ought I finde; not but that very strange and wonderfull things might be done in this kinde and many other waies, if there were any encouragement for Artists, or if any would go to the expence of proving some usefull experiments, that are projected and thought feasible by ingenious and rational heads for the publick benefit.

Archimedes, that rare wit of *Syracuse*, made a Sphear of Glass, which did represent the perfect order and motions of the Heavenly bodies, which (besides many others) *Claudian* makes mention and describes in one of his Epigrams, which is set down before in the 7th Chapter.

de Magnete,
lib. 1. c. 1.

But *Athanasius Kircher* (whom wee often mentioned) doth affirm, That the Sphear

Sphear was not all of Glass, but onely the outside of it, that men might the better discern the wheels and motions within; yet *Petrus Ramus* tells us, that he saw at *Paris* two Sphears of Glass like those of *Archimedes*; one brought from the *Sicilian*, the other from the *German* spoils.

Marcus Scaurus made an Amphitheater of Glass, as *Pliny* relates in the 36th book cap. 15. But I finde by others that the Pavement was of Marble, and but the middle scene or story of Glass; which Glass was not our common Glass, neither (as I suppose) but rather *Obsidian* glass, which the same *Pliny* mentions elsewhere, and is found (or rather was found, for we hear of none now) in *Ethiopia*, which is very black like jet, and transparent as glass, friable and easy to be wrought with the cheefel; of which sort of glass was the stately Tomb which *Ptolemy* King of *Egypt* built at *Alexandria* for a Monument of *Alexander* the Great, as *Strabo* relates: L. 17. Geogr. And *Herodotus* also tells us, that this natural fossil-glass called *Obsidian*, was wont to be wrought hollow, and placed about dead bodies, as a Case through which

which they might be seen of the beholders. The Specular stone was of this kinde, but that it was brighter and liker to Crystal.

It was (anciently) used for windowes (as *Martial* shews) to keep out cold.

*Hibernis objecta notis specularia puro
Admittunt soles, & sine face Diem.*

It was also used for a defence to some choice fruits, that they might not be nipt in the bud with the cold frosts and Northern windes; but this kinde of Stone is not now extant; *Guido Pancirollus* returns it *inter non inventa*. Tit. 6.

Leander in his description of *Italy* makes mention of a compleat Galley of Glas that he had seen at *Venice*, and also a pair of Organs of Glas; to wit, of fusile or common ordinary Glas. Mr *James Howell* saw such a Galley at the *Murano* of late times, as he informs us in his History of *Venice*.

As Glas is diaphanous, and permits a free passage of *species* through its body, as freely as air or water doth, so it is also reflexive, and beats back the said *species* that fall upon it; if the back side of it be lined with Tinn-foil,

foil, that is, the leaf of Tinn, Silver, or other metal ; and thus Looking-glasses are made, whereof there is manifold use, besides what Ladies use them for: for with such kinde of Glasses many strange feats may be performed, so strange, that it hath betrayed some men to a suspicion of *Magick* and unlawfull Arts, who have used to shew some representations and apparitions, either in the air or otherwise, when ignorant people did not understand the Contrivances or art of them.

CAP.

C A P. X.

N A Y T I K H:

O R,

*The Invention of Shipping
and Sailing ; as also of
the Mariners Compass.*

S Ayling was an Invention no less use-
full than bold ; the Sea is a rough
and dangerous Element, yet men have
taken the boldness to set their foot upon
the back of it, and ride upon the surging
billows with a wooden horse : *Equo lig-
neo vehuntur per vias caruleas*, saith the
Comical *Plautus*. How farr will Art
(joyned with courage) carry a man ?
Illi robur & as triplex circapectus erat,
&c. That man (saith *Horace*) had a heart
of oak and a breast lined with brass, that
did first adventure to confront the winds
and waves in a small tottering bark, when

at every step he goes, he treads upon his grave.

*Et prope tam lethum quàm prope
cernit aquam.*

Which the Author of the book of *Wisdom* hath expressed thus.

Verily, desire of gain hath devised Ship-
ping, and the workman built it by his skill.

But thy Providence, O Father, governs
it, for thou hast made a way in the sea and a
safe path in the waves.

Shewing that thou canst save from all
dangers, yea though a man went to sea with-
out Art.

Nevertheless, thou wouldst not that the
works of thy wisdom should be idle; and
therefore do men commit their lives to a
small piece of wood, and passing the rough
Sea in a weak vessel, are saved. *Wisd. 14.*
2, 3, 4, 5.

We shall admire their boldness the
more, if we consider what Implements
they had in the first ages to sail in, and
some people at this time. The *Egyptians*
used to make boats of Reeds and Bull-
rushes, saith *Pliny*, l. 13. *Nat. Hist.* and
Lucan. l. 4. *Pharf.*

— *Sic cum tenet omnia Nilus*

M

Conferitur

*Conseritur bibula Memphitica cymba
papyro.*

Which kinde of boat or basket *Moses* was put to swim in, when *Pharoah's* daughter took him up. The Prophet *Esay* makes mention of such Utensils, in that *Periphrasis* of *Egypt*; *Wo to the land shadowing with wings, that sends Embassadors by sea in Bulrushes, Isa. 18. 12.* *Papyraceis navibus armamentisq;* *Nili navigantus, Plin. Nat. Hist.* The *Indians* had the like boats, *Indorum rates Scirpea, atq;* *etiam vestes, Herodot. l. 1.*

The *Brittains* of Old had their *Naves Vitiles*, as *Pliny* calls them; the *Irish* and the *Natives* call them *Corraghes*, & some *Corracles*; they were little Vessels of wicker, covered wth leather, & not much bigger than a basket, with which they would as proudly bestride the seas as *Fason* with his *Argo*. *Lucan* mentions and describes them thus, l. 4.

Primum cava salix, madefacto vimine,
ne, parvam

Texitur in puppim, cæsoq; induta
Juvenco

Vectoris patiens tumidum superenatat
Annem:

*Sic Venetus stagnante Pado, fusoq;
Britannus*

*Navigat Oceano: sic cum tenet omnia
Nilus*

*Conferitur bibula Memphitica cymba
papyro:*

— Of twiggs and willow bor'd,
They made small boats, covered wth
bullocks hide,
In which they reacht the Rivers far-
ther side.

So sail the *Veneti*, if *Padus* flow:

The *Brittains* sail on their calm

Mr May;

Ocean so:

So the *Egyptians* sail with wooven
boats

* Of papery rushes, in their *Nilus*
floats:

* These
kinde of
Baskets or
Boats de-
scribed by
Lucan, were

ed by *Julius Caesar*, to transport his army over the river *Sicoris*
ainst *Petereus*, and other rivers elsewhere; and he had learnt the
aking of them (as it seems) from the *Brittains*, when hee was
his Island, as himself confesseth in his first book *de Bello*
Gallico; *Cujus generis, cum superioribus usus Britannia docuerat*:
d hee describes them thus: *carina primum ac statumina ex le-*
gum materia fiebant, reliquum corpus navium viminibus contextum
et inter se iniegebatur. Loco citato.

They have the like Vessels on the river
Apphrates to carry commodities to *Ba-*

M 2

bylon;

bylon, and so like to these *Brittish* ones, that (according to *Herodotus* his description of them) a man would think that either the *Brittains* borrowed the pattern from the *Babylonians*, or the *Babylonians* from them : For *Herodotus* in *Clio*, that is, the first book of his History, saith, that they had boats made of *Osier* or *Willows* of an orbicular for, in fashion of a Buckler, without prow or poop, and covered over on the outside with the hide of a bullock tann'd : In these, besides other Countrey-commodities, they used to [carry Palm-wines (in tonns) to be sold at *Babylon*; two men with an oar a piece in their hands guiding the Vessel.

These Vessels were so light, that the owners used to carry them upon their backs to and from the water; the Master would carry his boat by land and the boat would carry it's Master on the water : As the *Arabian* Fisher-man useth to do with his Tortoise shell, which is his shallop by sea and his house on the firm land, under which he sleeps; which we have expressed in this Latine Epigram.

*Hæc ratis atque domus ; nostræ en
compendia vitæ !*

*Hæc habitat sollers, hæc mare sul-
cat Arabs.*

*Se tegit hæc terris, hæc victum querit
in undis :*

*Ipsa domus dominum portat, &
ipse domum.*

This I found expressed (afterwards)
by the excellent *du-Bartas*, and his no-
less excellent interpreter *Sylvester*, thus :

The *Tyrian* Merchant or the *Por-
tugez*

Can build one ship of many trees ;
But of one Tortoise when he list to
float,

The *Arabian* Fisher-man can make a
boat.

And one such shell him in the stead
doth stand,

Of Hulk at sea, and of a House
by land.

Much like these are those which the *Æ-
gyptians* use (at this day) upon the *Nile*,

M 3 which

which they took upon their backs when they came to the Cataracts and steep falls of that River.

*De politia
illustrium,
lib. 4.*

Boterus calls them *Naves Plicatiles*, and which they use in some places of the West-Indies. For in the year 1509, we read that there were brought to *Roan* seven Indians in one small vessel or boat, which was so light that one man could lift it up with his hand, as the same *Boterus* relates.

In some places of the West-Indies they fish with Fagots made of Bulrushes, which they call *Balsas*; having carried them upon their shoulders to the sea, they cast them in, and then leap upon them & then row into the main sea with small reeds on either side, themselves standing upright like *Tritons* or *Neptunes*; and on these *Balsas* they carry their cords and nets to fish with. *Joseph. Acosta*, l. 3. c. 15.

Strabo sailed to *Egypt* in a small thing like a Basket made of wicker, as himself relates in the seventeenth of his Geography. The Indians have long boats called *Canoes*, neatly made up of one tree made hollow. In *Greenland* the Fishermens boats are made like Weaver shuttles, covered outwardly with skin

of *Seals*, and fashioned and strengthened with the bones of the same fishes, which being sewed together with many doubles, are so strong, that in foul weather they will shut themselves up in the same secure from the rocks, winde and weather. *Purchas l. 8. of America.* These are about 20 foot long, and 2 foot and a half broad, and so swift that no ship is able to keep way with them; and so light, that one man may carry many, and they carry but one oar.

I saw a ship (saith a learned man, and one that spent 40 years in travels, and the onely man that I reade of that outstript *S^r John Mandevill*, who travelled but 33 years (as *Balaus* delivers) laden with *Arabian* Merchandize, which was made up without Iron, but the plancks and ribs weres sewed with cords, and the futures covered with sweet smelling *Rosine*, which came from the *Franckincense* tree. The tacklings, sails, and every part of the ship was made of one tree, which bears the *Indian Nut*. So *Petrus Gellius* in his description of the *Thracian Bosphorus*.

—The Indian Nut alone
Is clothing, meat and trencher,
drink and kan,
Boat, cable, sail, and needle all in
one.

So that pious and *Seraphic* Poet Mr
George Herbert.

At first, one small tree did serve to
make a boat, being made hollow : After
this, men stiched large plancks and
boards together with Prows and Poops,
fit to plow up the *liquid* plains; then they
added Masts and Sails, and gathered the
winde in a sheet, for to drive those Hulks
on their way. The *Tyrians*, who were fa-
mous Navigators of old, are said to be
the first that made such kinde of Vef-
sels.

*Utque maris vastum prospectet
turribus aquor,
Prima ratem ventis credere do-
cta Tyros.*

Ovid tells us, that *Jason* King of *Thes-
saly* was the first contriver of ships;

—*primaq; ratis molitor Iason.*
And that his ships name was *Argo*, where-
with

with he fetcht the Golden Fleece from
Colchos, and which the Astronomers
 afterwards have stellified or fixed as a
 Constellation in heaven.

*Vellera cum Minyis nitido radiantia
 villo,*

*Per mare non notum primâ petiere
 carinâ.* Ovid. *Metam.* l. 6.

Lucan confirms the same, l. 3.

*Inde laceßitum primò mare, cum rudis
 Argo
 Miscuit ignotas temerato lictore
 gentes.*

The Fish called *Nautilus*, or the
 Little Mariner, was *Navigiorum Arche-
 typus*, the first type or pattern of a Ship;
 for when he is to swim, he composeth
 his body and finns into the form of a
 Galley under sail: from the sight where-
 of, some (as *Pliny* conceives) took the
 first hint of framing a Ship. As from
 the sight of a Kite flying in the air and
 turning and steering himself with his
 tayl (as fishes do in the water) some have
 devised the stern of a ship, *Natura mon-
 strante in cælo, quod esset opus in pro-
 fundo*, as *Pliny* l. 10. and *Seneca* also
Epist.

Suet. in
Vita.

Pancirol.
de rebus
nuper in-
uentis, tit.
38.

Epist. 91: Nulla ars intra initium suum steterit: As there is no art but receives addition and perfection by degrees, so hath this: *Caligula* made a stately Galley of Cedar, with spacious Halls, and costly rooms therein, with gardens also and trees (fresh and green) upon the Decks, like the *Pensill* gardens of *Semiramis*; so that it seemed a *floating garden*, as well as a *floating Castle*. But *Ptolemaus Philopater* outstript him far, who built a Ship (saith my Author) that the like was never seen before or since; It was two hundred eighty cubits in length, fifty two cubits in height from the bottome to the upper Decks; it had four hundred banks or seats of Rowers, four hundred Mariners, and four thousand Rowers, and on the Decks it could contain three thousand souldiers; there were also Gardens and Orchards on the top of it, as *Plutarch* relates in the life of *Demetrius*.

Thus what was invented at first for necessity, is now improved to Ryot and Luxury.

Vitruv.

The Ancients had a way to drive their ships without Oar or Sayl, so that they could never be wind-bound; they had in their ships three wheels on each side, with eight

eight radii of a span long jetting out from every wheel; six Oxen within did turn this Machin and wheels, which casting the water backward, did move the ship with incredible speed and force; they had in these ships an instrument called *Gar-rum*, which went with wheels in fashion of a Dyal, which at the end of every hour did let fall a stone into a Bason, and so divided the hours of the day.

There have been Boats made here in England to go under water, which my Lord of St Albans seems to touch, *Audi-* No. Orga-
num, l. 2.
mus inventam esse Machinam aliquam Naviculae aut Scaphæ, quæ subter aquis vehere possit ad spatia nonnulla: We are not now content to sail upon the waters, but we must sail under them too.

I know not whether *Iulius Scaliger* was a braggard or no, but he doth confidently aver, that he could make a ship that could steer her self as easily as kiss his hand (as we say) *Naviculam sponte sua mobilem ac sui remigii authorem faciam pullo negotio;* and to frame a flying Dove like that of *Archytas vel facillimè profiteri audeo*, saith the same great Scholar, *Exer.* 326.

In a *Naumachia* or representation of a
Naval

Naval fight in the time of *Claudius Caesar*, a Triton (or Sea god) sprung up in the midst of the Lake, sounding aloud with a silver Trumpet, *Suet. in vit. Claudii*. *Juvenal* makes mention of earthen boats to sail with, used also in *Egypt*; for speaking of the deadly feud and fighting between the Towns of *Ombos* and *Tentyra* about their gods, he speaks thus, *Sat. 15*.

Hac sevit rabie imbellæ & inutile vul-
gus

Parvula fictilibus solitum dare vela
Phaselis,

Et brevibus pictæ remis incumbere
testæ.

*An Appendix of the Mariners Card
or Compass.*

THough these flying Coaches on Sea were brought to great perfection many years since, yet there was no small deficiency in the Art of Navigation before the use of the Compass was found

found out; which was invented first here in *Europe* by *Iohn Goia*, or *Flavius Goia*, as others call him, of the Town of *Amalphi* in *Campania*, in the Kingdom of *Naples*.

Prima dedit Nautis usum Magnetis Amalphi:

Du Bartas calls him *Flavio* in these words,

We are not to *Ceres* so much bound
for bread,

Neither to *Bacchus* for his clusters
red;

As Signior *Flavio* for thy witty tryal,
For first inventing of the Seaman's
Dyal.

Before this invention, Pilots were directed in their right voyages by certain stars which they took notice of, especially the *Pleiades*, or *Charles his Wain*, and the two stars in the tayl of the Bear, called *Helice* and *Cynosura*, which are therefore called *Lead-stars*, or leading stars; As Travellers in the Desarts of *Arabia* and those of *Tartary* were always guided by
some

some fixed stars in the night time, to steer their courses in those pathless & uncouth ways, so Seamen were directed by the like heavenly guides, in the pathless wilderness of waters, before this excellent invention was found out.

Sidera Cuncta notat tacito labentia Cælo.

So *Virgil* speaks of *Palinurus*, who was Shipmaster or chief Pilot and Steersman to *Aeneas*; but if the sky chanced to be overcast, and the stars to be curtain'd with clouds, then the most experienced Mariner was at a loss, and must cast Anchor presently, and take up his rest.

Scat. l. 1.
Theb.

*Cutis neq; Temp Piger, nec amico Sidere
monstrat*

*Luna vias, medio cæli pelagique in-
multu*

Stat rationis inops——

But the ingenious *Amalphitan* hath devised a remedy against this grand inconvenience, and found a way that men might steer a certain and infallible course in the darkest nights, and this by the help of a little stone, called (from the use and benefit)

benefit) the Loadstone. This Loadstone is now our Load-star, and the Mariners *Directory*. This stone (for the universal benefit and use of it) is the wonder of all stones; as *Rablais* said, that a Millstone was the most precious stone of any other, so I may say, that a Loadstone is comparable to all the gems and precious stones in the world; it is but obscure and mean in sight, no sparkling lustre to be seen in it.

—— *Lapis est cognomine Magnes*
Decolor, obscurus, vilis, &c.

Claud. de
Magnete.

Si tamen hic nigri videas miracula saxi
Tunc superat pulchros cultus, & quic-
quid Eoi

Indus littoribus rubrâ scrutatur in
Algâ

This stone hath two strange properties, the one of *Attraction*, the other of *Direction*; this property of *Direction*, (which chiefly concerns our present business) is, that being set in a dish, and left to float freely upon the water, it will with one end point directly to the North, and with the other to the South, and will give this faculty or property to a needle that is rubb'd or touched with it.

From

From these two faculties of *Attraction* and *Direction*, many excellent, useful, and ingenious Inventions have bin found out, especially this *Pyxis Nautica*, or Mariners Card or Compass, which carries a needle touched with the Loadstone in the middle of it, with two and thirty Rumbs or lines drawn round about it; according to the number of the Cardinal and Collateral Winds. Now this animated needle shews with the Lilly-hand (or point) the North in any part of the world, which is a great help to the Pilot to direct him to what point of the Compass to steer his course.

This *Pyx* or Card is no less useful by Land then it is by Sea; so that they that travel through Desarts, as the *Carovans* do to *Mecha* and *Medina*, and other places, do now make good use of this device, whereas heretofore some star was their best guide by night.

Pliny speaks of the Inhabitants of *Talprebana* (now called *Sumatra*) that because they do not see the *Pole-Star* to sayl by, they carry with them certain birds to sea, which they do often let fly; and as these birds by natural instinct fly always towards the land, so the Mariners direct their course after them.

In *Syria*, and some Countries of the East that are covered with sand, so that there is no tract or path to guide the Traveller, and those sands are also scorching hot, that they cannot be endured by day, they travel by night, and by the direction of certain stars, which they use as certain way-marks to steer their course by: As *Mor Isaac* in *Philosophia Syriaca*. So also in the Country of the *Bactrians*, as *Curtius* relates: *Navigantium modo Sidera observant, ad quorum cursum iter dirigunt, Curt. l. 7.*

Lud. Bartema relates, that they that travel over the Desarts of *Arabia*, which are all covered with light and fleeting sands, so that no track can ever be found, do make certain boxes of wood, which they place on Camels backs, and shutting themselves in the said boxes to keep them from the sands, and by the help of the Loadstone like the Mariners Compass, they steer their course over the vast and uncouth Desarts. Some do ascribe this invention to that ingenious people of *China*. *Dr Gilbert* affirms, that *Paulus Venetus* brought it first into *Italy* in the year 1260, having learn'd it from the *Chinois*, as he saith *l. 1. de Magnete, c. 2.*

N

and

and *Ludovicus Vertomanus*, another traveller, saith, that when he was in the East Indies about the year 1500 (above an hundred and fifty years since) he saw the Pilot of his ship direct his course by a Compass (framed after the same manner as we have now) when he was sayling towards *Java*.

The Mariners Compass is not brought yet to that perfection, but that it requires some rectification and amendment; for the Magnetique Needle doth not exactly point to the North in all Meridians. but varies and swerves (in some places more, in some less) from the Direct posture, Configuration, and Aspect of the North and South, which puts Seamen to much distraction, and makes them run oftentimes on dangerous errors. *Van Helmont* a great *Paracelsian* of *Germany*, professeth a ready way to rectifie this grand inconvenience, namely, how to make a Needle that should never vary or alter from the right point, which may be performed by a strong imagination, as he saith, thus; If a man in framing the Needle shall stand with his back to the North, and place one point of the Needle (which he intends for the North) directly towards himself,

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himself, the Needle so made shall always point regularly and infallibly toward the North without variation. I wish that some *Fancy-full* man of an exalted imagination would make some Needles for experiment after *Helmont's* direction, since it is a business of great concernment to the publique Weal, to have this business rectified.

N 2

CAP.

CAP. XI.

‘ΗΜΕΡΩΤΙΚΗ:

O R,

*The Art of Cicuration and
Taming wilde Beasts.*

WHile I look back upon the title of the Book, which is *Historia Naturæ subactæ*, The History of Nature subdued and brought under the power of man; I conceive this ensuing Chapter will be no digression or seem impertinent, but will prove pertinent enough to the scope and design of the work. In this *Theater* of mans wit, it will not (a little) illustrate the power of it, if we bring wilde Beasts upon the stage, to shew that the most savage creatures have been managed by mans wit and made docile and tractable for all services and employments.

The Spirit of God hath spoke it ;
That

That every kinde of Beasts and of Birds,
and of Serpens, and things in the sea is
tamed and hath been tamed of mankinde,
Jam 3.7. I shall verifie and confirm
this position of the Apostle by Exam-
ples of several kinds.

I. For BEASTS; *Aspice Elephan-* 1. 2. de Ira
torum colla iugo submissa, saith *Seneca*;
behold the Elephant, w^{ch} is the strongest
and biggest beast in the Forrest, yet this
hath been tamed and managed and made
serviceable for all the offices both of
Peace and Warr. It hath been taught to
draw and carry; some ride him for the
Warrs; some yoke him for the plough;
& some make him to draw their Coach,
as the Emperour *Gordian* had some to
draw his, as *Fulius Capitolinus* reports of
him. Many stories (that seem incredi-
ble) of the *Officiousness* and *Docileness*
of this creature, you may reade amassed
together (out of several Authors) by
Lipsius in one of his Epistles *ad Germa-*
nos.

The Lion himself, whom some term
the King of Beasts, hath been (by the
dexterity of mans wit) made tractable
and officious for many Menial Offices.
Mark Anthony had Lions to draw his

Triumphal Chariot, as *Pliny* reports, *Primus Roma Leones ad Currum junxit* *M. Antonius, non sine quodam ostento temporum, generosos spiritus jugum subire illo prodigio significante, Pl. l. 8. c. 16.* Hanno the Carthaginian had a Lion so tame and familiar, that he could either ride him or lead him with any carriage for to bring it to Market, as *Plin. lib. 8. Nat. Hist. cap. 16.* and *Maximus Tyrius serm. 32.* do relate. But this cost him a Banishment; for the jealous Carthaginians began to fear that he might soon put the reins in their mouths and ride them too, that had done so by a Lion. It is no Poetical fable (perhaps) that Tygers drew the Coach of *Bacchus*, which *Silius Italicus* makes mention of.

—odoratis descendens Liber ab Indis
Egit Pampineos franata Tygride
Currus.

For that Monster *Heliogabalus* had Lions and Tygers (at once) to draw his Coach, as *Lampridius* relates in his life.

Martial, lib. 8. Epist. 26. mentions the same in *Domitians* time,

Vicit

*Vicit Erythraeos tua (Cæsar) arena
triumphos,*

*Et victoris opes, divitiásque
Dei.*

*Nam cum Captivos ageret sub Cur-
ribus Indos,*

*Contentus geminâ Tygride
Bacchus erat.*

And that the fierce *Byssons* were taught to draw the Chariot ; and also Stags at their publick shews, is affirmed by the same Poet. As I have seen in *England* by *Walton* upon *Thames* 4 Stags drawing a small Coach ; and it is no poetical fiction that Stags drew the Coach of *Diana*, as *Claudian* the Poet sings of her.

——— *Frondosâ fertur ab Alpe*

*Trans pelagus ; Cervi currum subiere
jugales.*

Fabricius Veiento, when he was *Prator* of *Rome*, brought into the *Cirque* a Chariot drawn by Dogs, as *Lipsius* tells me in his notes upon *Tacitus* : nay, *Estridges* have been taught to draw in a Coach by the Emperour *Firmus*, as *Textor* reports in his *Officina*.

The Count of Stolberg in Germany
had

had a Deer which he bestowed on the Emperour *Maximilian* the Second, that would receive a rider on his back, and a bridle in his mouth, and would run a race with the fleetest horses that came in the field, and out-strip them too, as *Michael Neander* relates, *Physic. part. 1.* *Martial*, l. 13. *Epigr. 26.* makes mention of a Deer used to the bridle.

*Hic erat ille tuo domitus, Cyparisse,
capistro,
An magis ille tuus, Sylvia, Cervus
erat.*

Sir Hierom Bomes at his return from *Muscovia* (where he had been Embassador) brought over certain *Doe*s of admirable swiftness, of the nature of the *Rangifer*, which being yoked and coupled together in a Coach, would carry one man with great speed, as *Cambden* in the *Annals* of *Q. Elizabeth* relates, *part. 3.*

The King of *Cambaia* hath tame Panthers, Lions & Leopards, which he useth as hunting dogs or Grey-hounds to hunt Deer and Wilde boars withall, as *Alian* reports, l. 17. *variar. hist.* and *Scaliger*, *Excer. 189.* At *Prague*, in the King of *Bohemia*'s Palace, *M^r Morison* saw two tame
Leo-

Leopards that would (either of them) at a call leap behinde the Huntsman, when he went abroad a hunting, and sit like a Dog on the hinder part of the horse, and would soon dispatch a Hart.

These Examples shew forth the excellency of mans spirit, which (by a discreet managery) can reduce those creatures (that have revolted from their Homage to their natural liege Lord and Sovereign, Man) to their primitive obedience, which they did once voluntarily and freely pay unto him before the fall of *Adam*, and before the first man revolted (by sin) from his maker; and we may see hereby that saying of *Xenophon* verified, *πᾶντι ζῷῳ πρότερον ἀρχὴν ἢ ἀνθρώπου*, it is far easier taming & managing any creature than man; and that of *Seneca*, *Est pullum animal homine morosius, aut majore arte tractandum*; there is no creature so wayward and fierce and untractable as man.

2. For *Serpents*, that have been tamed by man (as the Apostle mentions) wee may vouch *Strabo* for a tame Crocodile in *Egypt* in the Lake of *Myris*: and *Seneca* for a tame Dragon that took meat from the hand of *Tiberius*; he mentions
else-

elsewhere, *repentes inter pocula sinuſq;
innoxio lapſu Dracones*, l. 2. de *Ira*. Dragons that crept upon mens tables among their cups, and harmleſſly along their boſomes: and the four-legged Serpents in *Cairo* were tame and harmleſſ, that wee ſpake of before in the Chapter of *Muſick*.

3. For *Birds* and wilde Fowle, we may inſtance in the *Eſtridges*, that were put to draw a Coach; in *Eagles*, that are trained in *Turky* like Hawks to fly at any fowl; in the *Crow*, that *Scaliger* ſaw in the French Kings Court, that was taught to flye at Partridges, or any other fowl, from the Falconers fiſt; and laſtly, in *Wilde-Ducks*, that are tamed and made *Decoyes*, to intice and betray their fellows, which is commonly known.

4. Then fourthly; for things in the *Sea* that have been tamed, we may inſtance in a fiſh called the *Manati*, or *Sea-Cow*, well known about *Hiſpaniola* and other places of the *West-Indies*; it hath the form of a Cow, and hath four feet, and comes often to land to eat graſs: *Peter Martyr* in his *Decads* ſpeaks of an Indian Cacique or Lord of the Countrey that had one of theſe tame Cows,
that

that would eat meat out of his hands, and was as sportfull as an Ape, & would carry his sons and servants (sometimes ten of them at a time) on his back, and waft them over a great Lake from one shore to another. We may instance also in the Sea-Horse that hath been tamed, and made tractable to carry men on his back, as *Leo Afer* reports of one he had seen, in his History of *Africa*; and in the Fish called *Reversus*, by whose help and admirable industry, the Indians used to catch Fish in the Sea, as *Bodin* relates in the third book of his *Theatrum Naturæ*: He is let loose at the prey, as the Greyhound from the slip, as *Purchas* saith; and *Peter Martyr* hath the like story of it in his *Decads*: *Pliny* speaks the same of Dolphins, which he had seen (in some places) to be used for to catch Fish, and to bring them to shore, and upon receiving some part of the prey, to go their ways; and if they failed in some point of service, they suffered themselves patiently to be corrected, as Setting-Dogs, and Qua-Ducks, or Decoy Ducks (as we commonly call them) use to be. This same is affirmed of the Dolphins by *Oppianus* a learned Writer, in his *Halieuticks*.

Hallenticks. Otters have been tamed, and taught to drive Fish into the Net, as Dogs use to drive cattle into the Fold, as *Cardan* relates.

But this is not all, wilde beasts and birds have been tamed not only for the service, but also for the pleasure and pastime of man: As man hath learn'd some Arts from them, so they have learn'd some from man: Camels have been taught to dance, as the African *Leo* hath seen in his Country. Elephants have also been taught the same; and not only on the earth, but also in the air, *ambulare per funem*, to dance upon the Ropes: *Seneca* is my Author for it, *Epist.* 85. The manner of teaching them to dance is thus, They bring some young Elephant or Camel upon a floor of earth, that hath been heated underneath, and they play on a Cittern or Tabor, while the poor beast lifts up his stumps from the hot floor very often, more by reason of the heat then any lust to dance; and this they practise so often, until the beast hath got such a habit of it, that when ever he hears any Musique he falls a dancing. *Bubsequius* saw a dancing Elephant in *Constantinople*, and the same Elephant playing

sands
Travels.

playing at ball, tossing it to another man with his Trunk, and receiving it back again.

Michael Neander saw in *Germany* a bear brought from *Poland*, that would play upon the *Tabor*, and dance some measures, yea dance within the compass of a round *Cap*, which he would afterwards hold up in his paw to the Spectators, to receive money (or some other boon) for his pains. There was a dance of Horses presented at the marriage of the Duke of *Florence*, which *Sir Kenelm Digby* mentions. An Assc hath not so dull a soul as some suppose; for *Leo Afer* saw one in *Africa* that could vie feats with *Bankes* his Horse, that rare Master of the *Caballistick Art*, whose memory is not forgotten in *England*.

Treatise of
Bodies.

The *Sybarites* (a people of *Italy* being given to delicacies) had taught some Horses to dance; The *Crotonians* hearing thereof, and preparing War against them for some former quarrel, brought with them some Flutes and Flutists to the War, who had direction to pipe it as loud as they could, when the *Sybarites* were ready to charge with their Horse; whereupon the *Sybarites* Horses, instead
of

of rushing upon the Enemy, fell a dancing, and so gave the victory to the Enemies thereby, as three grave Authors have recorded, *Diod. Sic. l. 12. El. l. 16. c. 23. Plin. l. 8. c. 42.*

*Baltasar
Castilione
de Aulico:*

A Baboon was seen to play upon the Guittar; and a Monky in the King of Spain's Court was very skilful at Chess-play. Some birds have been taught to speak mans language, and to utter whole sentences of Greek and Latine articulately; There were seen in Rome Stares, Pyes, and Crows, that could do this to the admiration of all men. Cardinal *Ascanio* had a Parror, that could repeat the Apostles Creed *verbatim* in Latine; and in the Court of Spain there was one that could sing the *Gam-us* perfectly, and if he was out, he would say, *No va bueno*, That is not well; but when he was right he would say, *Bueno va*, Now it is well; as *John Barnes* an English Frier relates in a most learned Book of his, *De Equivocatione*. What witty feats and tricks Dogs have been taught to do, are so well known, that I may spare instances of this kind. Many of these examples that I have produced to make good the Title of this Chapter, and the Apostles saying
above-

above-mentioned, are briefly sum'd up by *Martial* in his Book of Shows, the 105th *Epigr.* which I have here annexed, with the Translation of *M. Hen. Vaughan Silurist*, whose excellent Poems are publique.

*Picta quod iuga delicata collo
Pardus sustinet, improbaq; Tygres
Indulgent patientiam flagello,
Mordent aurea quod lupata Cervi;
Quod Frœnis Lybici domantur Ursi,
Et quantum Caledon tulisse fertur
Paret purpureis Aper Capistris.
Turpes^a effeda quod trahunt Bifontes^b
Et molles dare iussa quod choreas:
Nigro^c Bellua^d nil negat Magistro,
Quis spectacula non putet Deorum?
Hæc transit tamen ut minora, quisquis
Venatus humiles videt Leonum, &c.*

^a Brittish
Chariots.
^b Wild
Oxen in
the Hercy-
nian For-
rest called
Buffles.
^c The Ne-
gro or
Black-
Moor, that
rides him.
^d The
Elephant.

That the fierce Pard doth at a beck
Yield to the Yoke his spotted neck,
And the untoward Tyger bear
The whip with a submissive fear;
That Stags do foam with golden
bits

And the rough Lybic bear submits
Unto the Ring; that a wild Boar

Like

(176)

Like that which *Caledon* of Yore
Brought forth, doth mildly put his
head

In purple Muzzles to be lead :
That the vast strong-limb'd Buffles
draw

The *Brittish* Chariots with taught
awe.

And the Elephant with Courtship
falls

To any dance the *Negro* calls :
VVould not you think such sports as
those,

VVere shews which the Gods did ex-
pose ;

But these are nothing, when we see
That Hares by Lions hunted be, &c.

Elephants (which are the most docile
creatures of all others, and come nearest
in sense to man) are taught to understand
the language of the Countrey, and to
perform all duties by the sole command
of their riders. Horses and Mules un-
derstand Carters language, who with
their terms of Art, as *Gee* and *Ree*, and
the like, will make them go or stop, turn
on the right hand or on the left, as they
please. *Clandian* observed this pretty
discr

discipline in French Mules, which he thought worthy of a cast of his pen.

*Aspice morigeras Rhodani Torrentis
alumnas*

*Imperio nexas, imperioque vagas,
Dissona quam varios flectant ad mur-
mura cursus,*

*Et Certas adeant voce regente vias.
Absentis longinqua valent praecepta
magistri*

*Frangorumque vices lingua virilis
agit.*

Mark how the docile Mules of Rhone
now close

And forward draw, now wheelingly
and loose;

What various courses at the Carters
voyce

They shape, and still tread new com-
manded ways;

Their distant drivers notes each one
observes,

And his loud tongue for bit and bridle
serves.

In France and Italy where they plow
with Horses, one man serves to hold the
O Plough

plough, and drive the horses too : Dogs have been trained up for the Wars by the ancient Brittons and Gauls, as Strabo and Camden relate; so have Bulls, and Boars, and Lyons, as appears by Lucret, lib. 5.

*Tentarunt etiam Tauras in manere
belli,
Expertisq; suis servos sunt mittere in ho-
stes.
Et validos Parthi præ se misere Leones
Cum Ductoribus armatis, sævisq; Ma-
gistris
Qui moderatier hos possent, vinculisque
tenere.*

Which instances have verified that Embleme and Motto of one of the German Emperours, which was, a Lion in a chain with this word, *Ars vincit Naturam*: and that of the Greek Poet,

Τεχνῶν κατὰ φύσιν, ὧν φύσιν νικῶμεθα.

Natura ubi superamur, arte vincimus.

And this of another cited by Grotius in his Annotations on his excellent Tract *de veritate Religionis*.

Βραχὺ τοι δέην ἀνέρος
 Ἄλλὰ ποικιλίαν πραγμάτων
 Δαμῶ φυλάττειν
 Χθονίων τε αἰθερίων τε παιδύματα.

*Vis exigua est, quamcunq; homini
 Natura dedit : sed consilium
 Varis artes qua nata mari,
 Et qua terrâ, aereque domant.*

*Una ratio omnes omnium animantium
 vires potestate in se continet. Plut. de Fort.
 Romanorum.*

*A summo opifice cuncta animalia serva
 facta sunt animanti ratione utenti. Orig.
 contra Celsum, l. 4.*

CAP. XII.

ΤΕΧΝΟ-ΠΑΙΓΝΙΑ :

O R,

*Certain Sports and Extrava-
gancies of Art.*

AS Nature hath her *ludicra*, so Art hath hers too ; that is, some pretty *knacks* that are made, not so much for use, as to shew subtilty of Wit, being made *de Gaiete de Cœur*, and for pastime as it were ; yet the workmanship and elegancy of these may justly deserve admiration ; and I may say of them as *Virgil* said of his Poem concerning Bees, *In tenui labi v est, at tenuis non gloria* : and we may further say of Artificial things, as *Cardan* spake of Natural things, *Non minori miraculo in parvis ludit Natura (ludit Ars) quam in magnis* : Art (as well as Nature) is never more wonderful then in smaller pi ces.

Saint

l. 4. Cœv.
l. 8. de
Var. c. 43.

Saint *Augustine* saith, That he did not know whether to wonder at more, the tooth of an Elephant, or that of a *Teredo* or Moth, which eats not only cloth, but consumes posts and pillars, whose tooth is so far from being seen, that the whole body of it is scarce visible. Some examples and instances of this kind, which I have casually lighted upon in tumbling over books, I have thought fit to annex to this former Rapsody.

Admiranda tibi levium spectacula re-
rum

Exhibeo

One *Callicrates* a Stone cutter of *Sparta*, made Ants of Ivory, with all their limbs, so small, that the eye could scarce discern them. *Myrmecides* the *Milesian* made a Chariot of Ivory, with Horses and Charioteer in so small a compass, that a Fly could cover them with her wings: He made also a ship with all her tacklings, that a Bee could hide it, *Pl. l. 7. c. 21. & l. 36. c. 5.* And *Ælian l. 1. var. hist. c. 52*, are my Authors.

Ovid speaks of the admirable chains & nets which *Vulcan* made to apprehend

Mars in conjunction with his Venus,
which were so fine and subtle,

— *Qua fallere lumina possent,*

That the wanton Lovers could not see
them till they felt them: Ovid describes
them thus, l. 4. *Metam.*

— *Exempla graciles ex ære Catenas,
Retiaque & laqueos, qua fallere lumina
possent,*

*Elimat, non illud opus tenuissima vin-
cant*

*Stamina, nec summo qua pendet aranea
Tigno:*

*Utque leves tactus, momentaque parva
sequantur,*

Efficit, & lecto circumdata collocat apte.

A VVaggon and Oxen made of glass
that might be hidden under a Fly, are
mentioned by Cardan, l. 10. var. c. 52.

Leander Alberti in his description of
Italy, makes mention of a Lock very
neatly and artificially made of VWood,
without any Iron in it.

But one Mark Scalio a Black Smith and
Citizen of London, for proof of his skill
and

and workmanship, made one hanging lock of Iron, Steel and Brass, of eleven several pieces, and a pipe key, all clean wrought, which weighed but one grain of gold, which is but one wheat corn. He also made at the same time a chain of gold of 43 linkes, to which chain the lock and key being fastened and put about a fleas neck; she drew the same with ease: all which lock and key, chain and flea weighed but one grain and a half: A thing most incredible to believe, but that I my self have seen it, saith M. John Stow, in the *Annals of Q. Elizabeth*.

Scaliger makes mention of a flea that he *Exerc. 136* had seen with a gold chain about her neck and kept daintily in a box; which for her food did suck her mistresses white hand.

Leo Afer saw the like flea and chain in *Memphis or Grand Cairo*, and the Artificer that made the chain had a suit of cloth of gold bestowed upon him by the *Soldan* after the manner of that Country. *J. 8. Hist. Afric.*

Had. Junius saw at *Mech'in in Brabant*, a cherry stone cut in the form of a basket, wherein were fourteen pair of dice distinct, each with their spots and number easily to be discerned with a good eye. *l. Animadvers.*

L. 17. De
usu pan-
tium.

Galen makes mention of a pretious stone enchased in a ring, wherein was the picture of *Phaeton*, most accurately cut, driving the chariot of the Sun, and being not able to rule his fiery Steeds, tumbling headlong into the River *Eridanus* (or the *Poe*) The world being all set on a flame, according to *Ovid's* description, l. 2. *Metam.*

George Whitehead whom we mentioned before, made a Ship with all her tacklings to move of its self on a table, with rowers plying the Oars, a woman playing on the Lute, and a little whelp crying on the deck. *Schottus in Itinera Italia.*

G.fferellus a Frenchman makes mention of a clock that he had seen at *Legorn*, made by a German (for these Germans are said to have their wits at their fingers ends) on which clock a company of shepherd's playd upon the bagpipes, with rare harmony and motion of the fingers, while others danced by couples, keeping time and measure, and some others capered and leaped. Cap. 6. of *Unheard of Curiosities.*

Cardan speaks of an Artizan at *Lions*, that made a chain of Glass that was so light and slender that if it fell upon a stone pavement,

pavement, it would not break, *Card. l. 10.
Var. c. 52.*

Amongst these *μικροτεχνία*, we may reckon an Iron Spider, mentioned by *Walchius* in his ninth fable, which was exactly made to the form and proportion of a Spider, and was also made to imitate his motions; which I confess was a singular piece of Art, if duly considered. And though these knacks are but little useful, and take up more time then needed to be lost, yet they discover a marvelous pregnancy of wit in the Artificers; and may be *experimenta lucifera*, if not *frugifera* hints of greater matters; of which Iron Spider I may say as *Du Bartas* speaks of the Iron Fly made by *Johannes Regiomontanus*, or *Fohn of Regensberg*, that rare Mathematician of his time,

O Divine Wit! that in the narrow
wombe

Of a small Fly, could find sufficient
room

For all these springs, wheels, counterpoize, and chains,

V Which stood instead of life, and spur,
and reins.

A Dutchman presented the Landgrave of *Hessen* (not many years since) with a Bear, and Lion of gold, that were hollow within, and each of the length of a man's middle finger, and every part and lineament of them answering truly to the proportion of the length, and both these did not exceed the weight of a French crown; but the Prince gave him three thousand Crowns in reward of his invention: A fair and Princely encouragement for ingenious Artists. *Claudian* hath an Epigram de *Quadriga Marmorea*, like that of *Callicrates* (mention'd before) made of Ivory; and it is thus,

*Quis dedit innumeras uno de Marmore
vultus?*

*Surgit in Aurigam curvus, paribusque
lupatis*

*Unanimes frangantur equi, quos forma
Deremit*

*Materies cognata tenet; Discrimine
nullo*

*Una flex tot membra ligat, ductusque per
artem*

*Mons patiens ferri, varios mutatur in
artus.*

What artful hand into one shape did
 put

So many different shapes; and all well
 cut:

The Driver on his Chariot mounted
 sits,

His well match'd horses with wrought
 marble bits

And reins, are curb'd; and though
 each Figure varies,

Yet all are but one piece; one marble
 carries

Unfundered, all those shapes, the pa-
 tient stone

Cut into various forms, shews all in
 one.

John Tredeskin's Ark in Lambeth, can afford many more instances of this nature; and so can the Archives of sundry Princes and private persons, who have their *Pinacotheca's* and *Technematophylacia* for to preserve all rarities; among others, we finde great mention of *Bernard Paludanus* a Physitian of *Enchuyssen* in *Holland*; at the sight of whose rarities a Traveller compos'd this following Epigram *ex tempore*,

*Orbe novo & veteri rarum & mirabile
quicquid*

*Dat natura parens, Artificisque ma-
nus:*

*Una Paludani domus exhibet, ingeni-
umque*

*Sublime ac studium testificatur Heri.
Translated.*

In the old world or new, what wonde-
rous thing

Did art to light or nature lately bring,
This *Paludanus* house doth shew a rare
Proof of the owners sovereign wit and
care.

Another you may finde touching this
business in *Grotius* his Poems,

FINIS.